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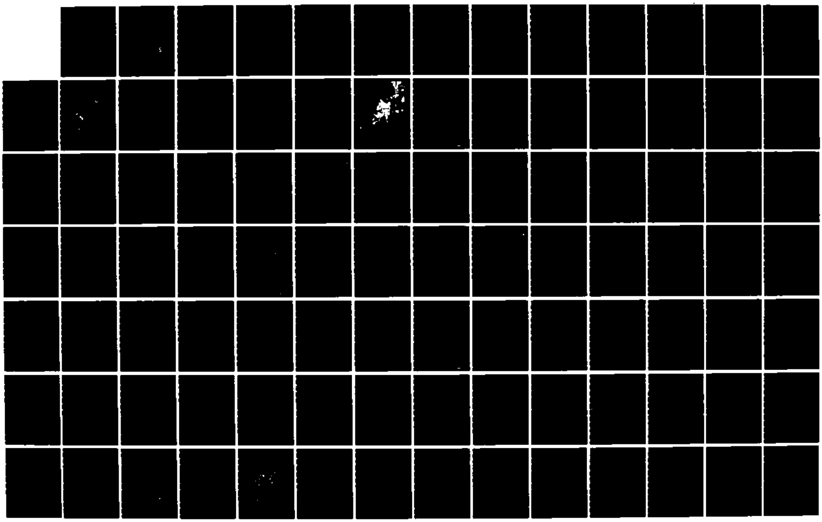

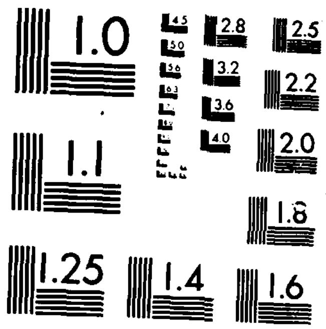

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Installation Restoration Program
Phase II — Confirmation/Quantification
Stage 1
Final Report
For
American Lake Garden Tract, Washington

Military Airlift Command
Scott Air Force Base, Illinois

Prepared for:
United States Air Force
Occupational & Environmental Health Laboratory (OEHL)
Brooks Air Force Base, Texas 78235

December 20, 1985

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

An IRP Phase II (Stage 1) Confirmation/Quantification Investigation was performed in the American Lake Garden Tract residential community as a consequence of previously confirmed groundwater contamination by like compounds both in the Garden Tract and on McChord AFB. A similar type of groundwater problem was believed to exist at the opposite end of the residential area, and may possibly be related to Army operations on Fort Lewis. The field study was designed to identify the type, quantity, and extent of groundwater contamination by expanding the study area to include all of the Garden Tract, the entire west half of McChord AFB, and the northern one-third of the Fort Lewis Logistics Center.

Field investigations consisted of 58,000 lineal feet of self-potential and 24,000 lineal feet of seismic refraction surveys. Forty electrical resistance stations were established. Twenty-six two-inch diameter monitoring wells were constructed. More than 225 water samples

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from more than 60 EPA, Army, and Air Force monitoring wells, plus domestic water supply wells were characterized for volatile organic chemicals. All wells were sounded at least weekly for static water levels, and in-situ hydrochemical properties were monitored.

Study results confirm independent sources of chlorinated hydrocarbon contamination exist on each military facility, and that these contaminants are migrating into different parts of the American Lake Garden Tract. Groundwater samples have been collected with measured concentrations of trichloroethylene or 1,2-trans-dichloroethylene in excess of local health department action levels. Trace levels of aromatic hydrocarbon contamination are found in groundwaters nearest commercial gasoline or automobile service stations in the Garden Tract.

Study recommendations are made to continue the availability of bottled or second-source water for consumptive use. Both the Army and Air Force should investigate the possibility of providing a second water source to the Garden Tract. McChord AFB should continue site investigations near or upon abandoned landfills beneath the 7th, 8th, and 9th, and possibly the 16th and 17th fairways of the base golf course to isolate, remove, or treat the source(s) of chlorinated solvents that appear to be migrating towards and into the American Lake Garden Tract. Fort Lewis should accelerate its groundwater investigations, particularly near Lincoln Drive and Old Landfill No. 2 so as to confine or remove the waste source and restore groundwater quality.

Installation Restoration Program
Phase II — Confirmation/Quantification
Stage 1
Final Report
For
American Lake Garden Tract, Washington

Military Airlift Command
Scott Air Force Base, Illinois

December 20, 1985

Prepared by:
Science Applications International Corporation
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Contract No. F33615-80-D-4002

Dennis D. Brownley, Major, USAF, BSC
Technical Program Manager
Technical Services Division (TS)

A-1

Prepared for:
United States Air Force
Occupational & Environmental Health Laboratory (OEHL)
Brooks Air Force Base, Texas 78235

NOTICE

PREFACE

Science Applications International Corporation has performed this IRP Phase II (Stage 1) Confirmation/Quantification Investigation under Delivery Order 62 of Air Force Contract No. F-33615-80-D-4002. Supplemental monitoring wells and supporting analytical chemistry were provided under Delivery Order 02 of Air Force Contract No. F33615-85-D-4509. The purpose of this investigation was to confirm the type and extent of groundwater contamination in the American Lake Garden Tract, Washington, as may be affected by adjoining military properties of McChord Air Force Base and Fort Lewis Military Reservation. Contaminant plume definition and direction is to be developed, and identification of sources made so as to lead to possible remedial actions.

Chlorinated hydrocarbon action levels for trichloroethylene and 1,2-trans-dichloroethylene are exceeded in some areas of the residential community. Different contaminant types and concentrations indicate that at least one source of contamination on each of the military installations is impacting local groundwater supplies. The zones of contaminated groundwater do not appear to be affecting one another. Low level benzene contamination within the American Lake Garden Tract may have as its source a gasoline service station now turned automotive garage. Recommended remedial actions include the development of an alternative water supply for approximately 50 to 100 potentially affected families, further investigations on Air Force property to confirm and isolate the suspected source and possibly restore groundwater quality, and continued remedial investigations on the Army base to confirm and eliminate groundwater contamination.

Field investigations began in April 1985 and were completed in July with the conclusion of groundwater sampling and sounding of depths to the water table. Major Dennis D. Brownley was the technical monitor for the United States Air Force Occupational and Environmental Health Laboratory. Captain Dulcie Weisman was the McChord Air Force Base Bioenvironmental Engineer during the Stage 1 investigations. Mssrs. Steve Miller and Randy Hanna provided environmental planning support from Fort Lewis. Science Applications International Corporation personnel who were instrumental in the success of this effort included John Meade and Lyn Baker, who provided contracts administration, and Greg Mack, Leigh Starlin, Barb Morson, Don Weston, and Jeff Stiefvater, who assisted in the field program. The authors also wish to express our appreciation to Jim Applegate, Brian Rodriguez, Bob Burk, Anthony Burgess, and the staff of Golder Associates for their help in the geophysical and hydrogeologic studies; James Farr for his soil gas analytical support; Vic Kring and his drilling crews; Tom Cullens, Jr. and the analytical support of Environmental Research Group; George Wessel, and MSgt James Adams and survey crews of McChord Air Force Base Civil Engineering, for well head and grounds surveying; and Major Allan Curlee and the McChord Legal Office for assistance in securing easements and right-of-way to properties on which wells were installed. Finally, our sincere appreciation is extended to J. Peter Dye, Kim Spencer, and Linda Wynands for their assistance in graphics work, project administration, and report preparation and production.

Richard W. Greiling, P.E.
Project Manager

Robert L. Peshkin
Geologist

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EXECUTIVE SUMMARY

This report presents the results of the Phase II (Stage 1) Confirmation/ Quantification Investigation performed in the American Lake Garden Tract, Washington, in accordance with the U.S. Air Force Installation Restoration Program. The investigation was performed to determine the volatile organic chemical types, areal extent, and if possible identify the sources of groundwater contamination present in a residential housing area located between McChord Air Force Base and the Fort Lewis Military Reservation.

The Stage 1 investigations were centered in the American Lake Garden Tract but extended east and north onto McChord AFB because of previously confirmed groundwater contamination by chemical compounds identical to those causing groundwater problems in the American Lake Garden Tract. Similarly, the field program extended south and west onto the Fort Lewis Logistics Center to join with ongoing Army remedial investigations. The Garden Tract field program included 58,225 lineal feet of self-potential survey, 24,400 feet of seismic refraction lines, 40 electrical resistivity soundings, a soil gas survey in a 50-station field, construction of 26 monitoring wells, and _in situ_ testing and sampling for volatile organic chemicals in more than 60 wells.

Study findings conclude that groundwater moves from McChord AFB westward across the northern boundary of the American Lake Garden Tract. This groundwater is contaminated by the chlorinated solvents 1,2-trans-dichloroethylene and to a lesser extent trichloroethylene. Both contaminants are found at concentrations which exceed drinking water criteria currently imposed by the local health department. Study results indicate the probable sources of these solvent contaminants are buried in closed landfills beneath the McChord AFB golf course. The contaminant plume is believed to be less than 250 feet wide as it leaves the base property line and is present in the water column 40 to 70 feet below the ground surface. Preliminary tests indicate the plume continues to be less than 250 feet wide as it moves into the American Lake Garden Tract. The leading edge of the contaminant plume is to a point approximately 800 feet west of Woodbrook Drive. Figure 1 shows the approximate location of this plume.

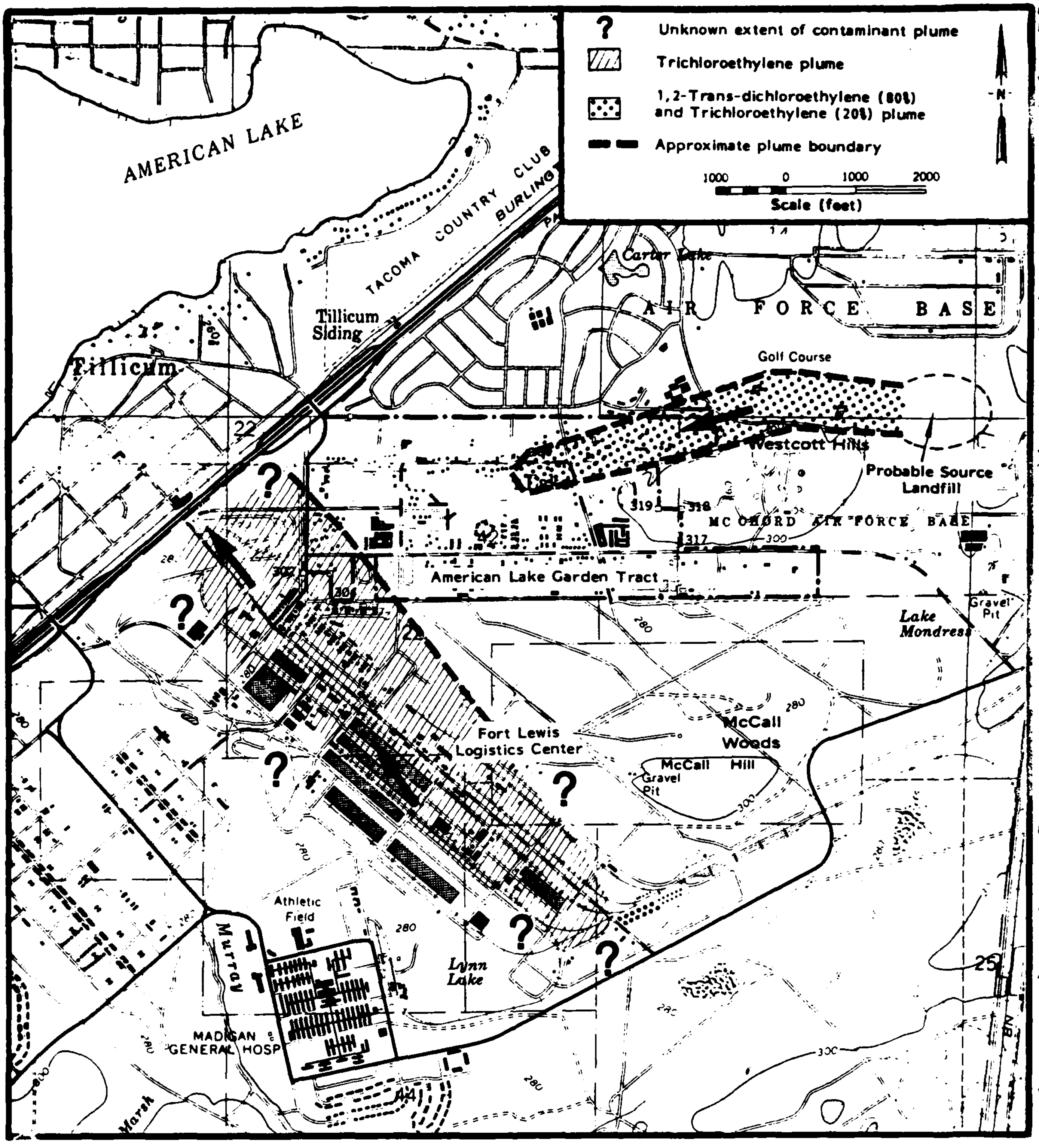

Figure 1

APPROXIMATED BOUNDARIES OF TCE AND 1,2-TRANS-DICHLOROETHYLENE
CONTAMINANT PLUMES IN THE AMERICAN LAKE GARDEN TRACT
STUDY AREA AS PRESENTED ON PLATE 4

Stage 1 investigations also conclude that groundwaters contaminated by even higher concentrations of trichloroethylene, but little 1,2-trans-dichloroethylene, are migrating north and west from the Fort Lewis Logistics Center. The eastern edge of this plume is passing beneath the southwest corner of the American Lake Garden Tract and may be impacting the domestic water supplies of 10 to 15 homeowners. Neither the south or west boundaries of the plume are yet defined, nor has the plume's northern leading edge been established by field confirmation. The source of the trichloroethylene contamination is suspected of being south of the Logistics Center and either within or west of an abandoned landfill. At least 28 monitoring wells have been installed in the Logistics Center. As of August 1, 1985, more than half of the wells constructed for the U.S. Army had not been developed. The lack of data from these wells prevent point source identification at this time.

Trace level concentrations of benzene were found in wells nearest a closed gasoline station. Generally, most domestic water supplies and monitoring wells away from the above described plumes indicate that volatile organic chemicals are not present in groundwaters beneath the Garden Tract.

Source identification studies should continue on both McChord AFB and the Fort Lewis Logistics Center. Soil gas transects followed by resistivity profiling and a magnetometer survey should be performed across old landfills near the McChord AFB golf course club house. As many as three sets of cluster wells may need to be constructed to determine the vertical presence of contamination within or caused by landfilled wastes. Fort Lewis monitoring wells already in place must be developed and a monitoring program initiated prior to the design of additional remedial investigation activities.

Remedial actions should be taken to restore a potable water supply to those American Lake Garden Tract residents whose local groundwater supplies have been contaminated by trichloroethylene and 1,2-trans-dichloroethylene at concentrations in excess of local action levels. Remedial action alternatives include provision for point-of-use water treatment; deepening the water supply wells of affected homeowners to a depth of 120 or more feet below the ground surface; construction of a permanent water system intertied with the local public water utility, or to connect a smaller number of homes to water supplies

surface; construction of a permanent water system intertied with the local public water utility, or to connect a smaller number of homes to water supplies serving McChord AFB and the Fort Lewis Logistics Center. Efforts should begin to restore local groundwater quality once interim water supplies have been provided to the affected residents. Volatile organic chemicals can be removed from groundwater with the construction of groundwater drawdown well fields and air stripping. The disposal of treated groundwater can likely be accomplished through discharge into local surface depressions and wetland marshes. The process of providing an interim water supply to affected property owners while simultaneously restoring groundwater quality may allow for the reuse of existing domestic water supply wells and possible avoidance of having to finance the installation of a permanent water distribution system.

1.0 INTRODUCTION

1.1 PURPOSE AND BACKGROUND

This section of the Phase II, Stage 1 report has been prepared to familiarize the reader with the objectives of the U.S. Air Force Installation Restoration Program and the need and its applicability in the American Lake Garden Tract residential community. Accordingly, this section is written with a time element of March, 1985, and presents a summary of events and information available at the onset of this field investigation. Information presented herein has been used in design of the resultant field program and in the presentation of findings, conclusions, and recommendations presented in subsequent sections of this report.

1.2 THE INSTALLATION RESTORATION PROGRAM

The U.S. Air Force (USAF), due to its primary mission of defense of the United States, has frequently been engaged in operations dealing with toxic and hazardous materials. Recognizing the potential for improper management of these toxic or hazardous materials, the Department of Defense (DoD) has implemented a program to identify the locations and contents of past disposal sites and eliminate the hazards to public health in an environmentally responsible manner. This DoD program is called the Installation Restoration Program (IRP). The current IRP policy is contained in the Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981, and implemented by Air Force message 211807Z January 1982. The IRP is defined in DEQPPM 81-5 as a four-phased program designed to assure that identification, confirmation/quantification, and remedial actions are performed in a timely and cost-effective manner. The initial IRP guidance was developed and published in June 1982. This document included in-depth guidance for Phase I, concept guidance for Phase II, and general guidance for Phases III and IV. The management concept for Phase II was updated by the Air Force Engineering and Services Center (AFESC) in May 1982. Each phase, briefly described, and its relationship to the overall program are:

1. Phase I - Installations Assessment (Records Search) - Phase I is the responsibility of the USAF's Engineering and Services Center. Its

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purpose is to identify and rank by degree of concern those past disposal sites that may pose a hazard to public health or the environment as a result of contaminant release or migration. It is determined in this phase whether a site requires further action to confirm an environmental hazard or whether it may be considered to present no hazard at this time. If a site requires immediate remedial action, such as removal of abandoned wastes, the action can proceed directly to Phase IV. Phase I provides the background documentation for the Phase II study.

2. Phase II - Confirmation/Quantification - Phase II is the responsibility of the USAF's Occupational and Environmental Health Laboratory (OEHL). The purpose of this phase is to define and quantify by comprehensive environmental and/or ecological survey the presence or absence of contamination, the extent of contamination, waste characterization (when required by the regulatory agency), and identify sites or locations where remedial action is required. Research requirements identified during this phase will be directed to AFESC for inclusion in the Phase III effort of the program. Needs for contaminant health standards will be identified to the Command Surgeon for resolution.

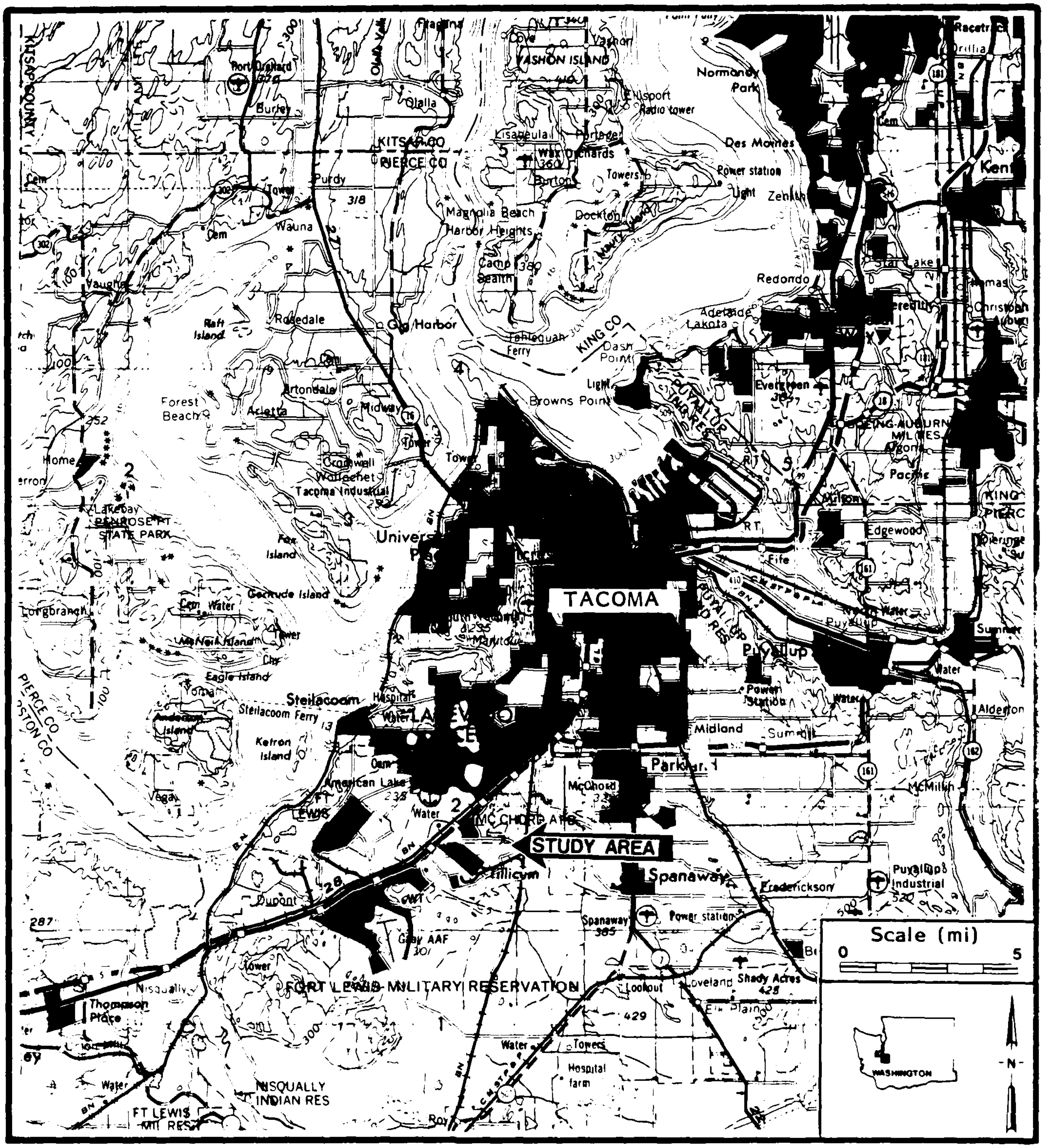
3. Phase III - Technical Base Development - This phase is the responsibility of the USAF's Engineering and Services Center. Its purpose is to develop a sound data base upon which to prepare a comprehensive remedial action plan. This phase includes implementation of research requirements and technology for objective assessment of adverse effects. A Phase III requirement can be identified at any time during the program.

4. Phase IV - Operations/Remedial Actions - This phase is the responsibility of the USAF's Engineering and Services Center and includes the preparation and implementation of the remedial action plan.

1.3 REGIONAL HISTORY AND MILITARY MISSION

The American Lake Garden Tract was originally settled as a small farming community at about the turn of the 20th Century (Green, 1985) and is now primarily a semi-rural residential community with a small commercial area, two schools, and several equestrian riding and boarding facilities. It is located approximately 10 miles southwest of the Tacoma city center (Figure 2) and is surrounded on all sides by either McChord Air Force Base (AFB) or the Fort Lewis Military Reservation (see Figure 3). The American Lake Garden Tract is rectangular in shape and has a resident population of approximately 3,000 people.

The history of the region surrounding the American Lake Garden Tract has had a military character almost continuously since the first white settlers reached



USGS Base Map

Figure 2

GENERAL LOCATION MAP OF THE AMERICAN LAKE GARDEN TRACT, WASHINGTON

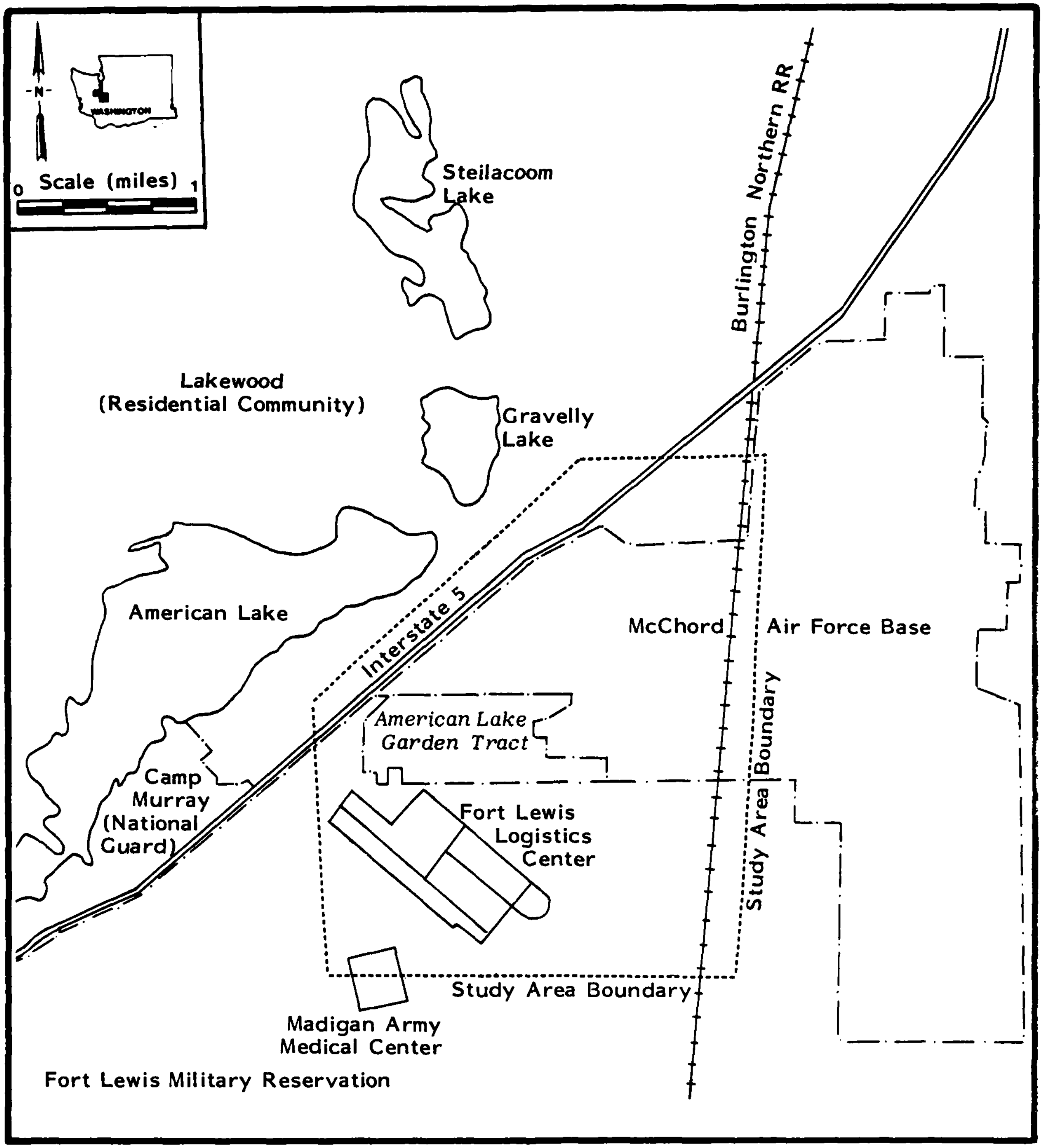


Figure 3

LOCATION OF THE AMERICAN LAKE GARDEN TRACT, ADJACENT MILITARY INSTALLATIONS, AND APPROXIMATE STUDY AREA BOUNDARY

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western Washington. Fort Nisqually was established in 1833 as a trading post and a military outpost on the shore of Puget Sound. The post was established approximately five miles west of the study area, and near what is now the town of Dupont (see Figure 2). In 1849, the United States Government established and manned Fort Steilacoom, five miles northwest of the study area, for protection against Indian attacks. Even during the long season of peace and quiet after the Indian dangers had passed, the State of Washington maintained National Guard encampments at American Lake (not to be confused with the American Lake Garden Tract) in the summer months. The first Washington Infantry, United States Volunteers, was mobilized and drilled at American Lake for the Spanish-American War of 1898. Camp Murray, training and staging facility for the Washington State National Guard, is located on these same training grounds.

In 1917, there came the largest military presence the region has known with the construction and maintenance of Camp Lewis (Leighton, 1918). Constructed south and west of the American Lake Garden Tract, Camp Lewis was the largest military post in the United States at that time and the first Army Cantonment area for draftee training to be opened (McMaster, et al., 1983). Conditions immediately preceding and during World War II caused an escalation of training and construction at Fort Lewis. Such construction included North Fort Lewis (1940), Gray Army Airfield and the Mount Rainier Ordnance Depot (both in 1941), and Madigan Army Medical Center (1943). Fort Lewis thus became the focal point for troop induction, training, embarkation, and debarkation in the Northwest (McMaster, et al., 1983).

The Mount Rainier Ordnance Depot was activated as an installation on Fort Lewis in April 1942. When first activated, it was known as the Fort Lewis Quartermaster Motor Base. Initial facilities consisted of two shop buildings, two small warehouses, and 13 permanent barracks. In August 1942, the motor base was transferred from quartermaster to ordnance jurisdiction and by 1943 was renamed Mount Rainier Ordnance Depot. Until 1963, when it was deactivated and its facilities turned over to the Logistics Center, the Mount Rainier Ordnance Depot was responsible for furnishing ordnance supplies and rebuild services to military installations within the states of Idaho, Montana, Oregon, and Washington and to overseas and Alaskan installations through Pacific Coast

Army terminals. Items serviced by the Mount Rainier Ordnance Depot included artillery, combat and transport vehicles and assemblies, fire control material, guided missile material, and small arms (McMaster, et al., 1983).

Fort Lewis remained an active training site following World War II. The Berlin and Cuban crises of the early 1960s created a need for troops from Fort Lewis. In addition, the increasing involvement of the United States in Southeast Asia reestablished Fort Lewis's role as a troop training center. In April 1972, Fort Lewis was redesignated Headquarters, 9th Infantry Division Fort Lewis and remained such until September 1981 when I Corps assumed command of the 9th Infantry Division Forces Command units and reserve components on Fort Lewis (McMaster et al., 1983).

In 1938, approximately 500 acres of land in the northern portion of Fort Lewis were transferred to augment the area (formerly Pierce County Airport) on which McChord Army Airfield was being constructed. This airfield was to be constructed east of the American Lake Garden Tract, with government-owned undeveloped lands north of the Garden Tract. The majority of the development of McChord Army Airfield occurred between 1938 and 1941. Primary construction consisted of two runways and four hangars. The base administration building, hospital, radio transmitter building, Air Corps barracks, maintenance building, coal-fired heating plant, and six residential buildings were also completed during this time. McChord Field was formally dedicated on 3 July 1940.

After dedication of the airfield, McChord served primarily as a bomber base and the home of the 17th Bombardment Group and the 89th Reconnaissance Squadron. These units flew the B-18 and B-23 aircraft. The base mission greatly increased following the Japanese attack on Pearl Harbor as McChord became the largest American bomber training base. The current host unit, the 62nd Military Airlift Wing (then designated the 62nd Transport Group), was assigned to McChord in 1947. Finally, on 1 January 1948, McChord Field was redesignated McChord AFB.

The primary mission of McChord AFB is that of the 62nd Military Airlift Wing (MAW) which provides for the airlift of troops, equipment, passengers, and mail during peacetime or wartime. Secondary or tenant missions include the 25th

North American Aerospace Defense Region; 318th Fighter Interceptor Squadron (FIS); 446th MAW; 1905th Communications Squadron; Detachment 11 17th Weather Squadron; Detachment 11 1369th Photographic Squadron; Field Training Detachment 502; and the 52nd, 53rd, and 86th Aerial Port Squadrons.

Aircraft presently at McChord AFB include the C-130 Hercules and the C-141 Starlifter (both assigned to the 62nd MAW) and the F-15 supersonic interceptor (assigned to the 318th FIS). The 318th FIS also conducts pilot training using the T-33 jet aircraft.

1.4 THE INSTALLATION RESTORATION PROGRAM AT McCHORD AFB AND THE FORT LEWIS MILITARY RESERVATION

1.4.1 IRP Phase I Records Search at McChord AFB

The IRP Phase I records search for McChord AFB, Washington was performed under contract by the consulting firm of CH2M HILL. The Phase I records search was initiated in March 1982, and the report was released in August 1982. Activities included a detailed review of pertinent installation records, contacts with 26 local and regulatory agencies which were known or suspected to have documents containing relevant information, and interviews with 81 former and present base personnel. A review of past and present industrial operations was obtained through available shop files, real property files, and historical records, photographs and maps.

Next to be considered was a review of the past and present management practices for landfill areas, dump sites, hazardous wastes, and accidental spills. The identification of landfill and other solid or liquid waste disposal and burial sites, solvent and fuel storage and disposal sites, and spills and leaks was the goal of this management protocol.

Once potential sites had been identified and inventoried by records search or verbal contact with personnel, a ground survey of specific sites was undertaken to observe the obvious signs of environmental stress (leachate, fuel stains, etc.) on the installation. All identified and surveyed sites were cataloged and designated on maps. Geomorphology, drainage, soil condition, hydrology, local meteorology and geology were carefully considered at each site.

A site evaluation rating was performed to quantify and rank, by environmental health risk priority, each site where there existed a potential for hazardous waste release. This rating evaluation system was developed by DoD and is called the Hazardous Assessment Rating Methodology (HARM). Like the other hazardous waste site rating models, the HARM model uses a scoring form to rate sites for priority attention. The model uses data obtained during the record search portion (Phase I) of the IRP. In assessing the hazards at a given site, the model develops a score based on four aspects of the hazard posed by a specific site: (1) the possible receptors of the contamination; (2) the waste and its characteristics; (3) potential pathways for contaminant migration; and (4) any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

A total of 26 sites were identified as suspected past or present solid waste disposal areas containing industrial, domestic, construction, and possibly hazardous wastes. In addition, 36 other sites were believed to have served as disposal pits, fire training areas, or spill sites of solvents and similar liquid wastes, fuels, or waste petroleum products.

Nineteen of the 62 sites were found not to be a potential threat to the environment or public health and safety in context of regulated hazardous wastes and were not later evaluated using the HARM rating model. The remaining 43 sites were rated using the HARM model. At the conclusion of the IRP Phase I records search, the USAF determined that the potential for off-site migration of hazardous wastes at McChord AFB was high because of permeable soils, high groundwater levels, high net annual precipitation, and the presence of surface waters. The Air Force also recognized that because some of the 43 sites evaluated had a moderate to high potential for contaminant release or migration, and because in some areas the sites are close together, possible additive effects may result from combined contaminant migration. As a result, 10 general areas were identified as having the highest potential for pollutant migration.

1.4.2 IRP Phase II Confirmation/Quantification Investigation at McChord AFB

In August 1982, the USAF Occupational and Environmental Health Laboratory (OEHL) contracted with JRB Associates, then a division of Science Applications

International Corporation (SAIC), to perform an IRP Phase II presurvey site evaluation and sampling design, and an IRP Phase II (Stage 1) Confirmation/ Quantification Investigation which provided a reconnaissance survey of the highest priority sites. The purposes of this survey were to identify hydrogeologic relationships and the presence or absence of site contamination. The findings of the reconnaissance survey were documented in an IRP Phase II (Stage 1) report dated June 1983. These studies concluded that regional groundwater flow is in a general northwest direction but appears to be divided into at least two flow patterns with one flowing northwesterly beneath the industrialized flightline, and one flowing westerly beneath the golf course and towards base housing. Suspected groundwater contamination by petroleum hydrocarbons, heavy metals, and trace level pesticides was indicated in several areas. However, neither the spatial distribution of sample sites nor the frequency of sampling was sufficient to confirm the type and extent of contamination or contaminant sources.

A Phase II (Stage 2) investigation was initiated in July 1983 to expand the sampling effort, replicate or confirm suspected contamination, and identify potentially feasible remedial alternatives. Eight of the 10 high priority areas (Areas G and I excepted) have been investigated to date under the IRP Phase II program. A description of each area and a review of findings presented in the Stage 2 report are described more fully in Section 2.7.2 of this report.

1.4.3 Fort Lewis Installation Assessment

An on-site installation assessment of the Headquarters, I Corps and Fort Lewis, Washington was conducted by the consulting firm of Environmental Science and Engineering, Inc. from May 24 through 28, 1982. The purpose of this assessment was to determine the past and current use of toxic and hazardous materials as well as the potential for these substances to migrate off the installation (McMaster, et al., 1983). The report of this investigation, released in September 1983, did not recommend a field survey of the installation.

A review of the past and current industrial operations on Fort Lewis include vehicle and aircraft maintenance, weapons repair, and furniture refinishing. The Fort Lewis Logistics Center serves as the primary maintenance facility on

the post. The Logistics Center was formerly the Mount Rainier Ordnance Depot which operated from 1942 until 1963. Aircraft maintenance at Gray Army Airfield includes all aspects of aircraft maintenance from minor levels which are performed by organizational personnel to major maintenance projects by general support personnel. Inclusive in both vehicle and aircraft maintenance activities are chlorinated hydrocarbon solvent degreaser baths, caustic sodium hydroxide paint stripping, and battery acid neutralization (McMaster et al., 1983).

The installation assessment also identified fourteen landfill or disposal sites on the Fort Lewis Military Reservation, four of which were still in use in 1983. Five of the closed landfills are within close proximity to the American Lake Garden Tract which, if they contain hazardous materials, may be adversely affecting local groundwater quality. A description of each site and a review of the findings presented in the Fort Lewis installation assessment are presented in Section 2.7.3 of this report.

A groundwater investigation has been taking place in and around the Fort Lewis Logistics Center since the conclusion of the Fort Lewis installation assessment. A total of 16 groundwater monitoring wells were installed by mid-spring of 1985 under the direction of U.S. Army environmental personnel. Several of the wells have been developed, purged, and sampled three times. Preliminary data indicate groundwater contamination at the Logistics Center. Data provided by the Fort Lewis environmental office show concentrations of trichloroethylene in excess of 400 ug/l in monitoring wells in the Logistics Center. The construction of additional groundwater monitoring wells was continued into early summer to determine whether or not U.S. Army facilities or waste disposal practices on Fort Lewis are contributing to groundwater quality problems in the area.

1.5 EPA FIELD INVESTIGATION OF GROUNDWATER IN THE AMERICAN LAKE GARDEN TRACT

The State of Washington Department of Social and Health Services conducted a groundwater resource investigation in southwestern Pierce County in 1981 during which samples were collected to determine the presence of organic compounds in the groundwater (Littler, et al., 1981). These studies were conducted in order to determine what further actions were necessary to protect groundwater

resources in the Chambers Creek/Clover Creek drainage basin beyond the ongoing construction of sanitary sewers and elimination of point source pollutant discharges. A total of 18 full scan analyses for the presence of organic priority pollutants were tested in groundwaters throughout the Chambers/Clover Creek drainage basin. An additional six tests were made of surface waters. Four groundwater samples and two surface water samples contained confirmed concentrations of organic contaminants. Water supply Well H-1, located one mile north of the Garden Tract across McChord base housing, is owned by the Lakewood Water District and was the only well of four with confirmed contamination to be near the American Lake Garden Tract. Groundwater from Well H-1 was analyzed by EPA Region 10 chemists and was found to contain 1,2-trans-dichloroethylene, trichloroethylene, and tetrachloroethylene (Littler, et al., 1981). These study findings have since led to a full remedial investigation and feasibility study, elimination of the contaminant source, and installation of groundwater treatment air stripping towers at the well pumphouse.

By early 1983, private homeowners in the northeast corner of the American Lake Garden Tract expressed concern to the local health department that groundwater color, odor, and clarity were changing. Both the Tacoma Pierce County Health Department and the U.S. EPA sampled and analyzed water from several domestic wells in the Garden Tract in February 1983 and confirmed that trichloroethylene, 1,2-trans-dichloroethylene, and coliform bacteria were present in the drinking water. EPA then conducted a groundwater monitoring program in an attempt to determine the extent and the source of the problem.

Ecology and Environment, Inc., under contract to the U.S. EPA, performed a groundwater investigation in the American Lake Garden Tract. A report of this investigation was released in March 1984. Between June 20, 1983 and September 9, 1983, eight boreholes were drilled and 17 groundwater monitoring wells were installed in these boreholes. Figure 4 shows the locations of these wells in the Garden Tract. Well depths range from 24 to 120 feet with not more than 10 feet of screen casing per well.

All wells were developed and purged prior to sampling for halogenated hydrocarbons. The level of detection was 1 ug/l for all samples. Two two-inch ID monitoring wells on McChord AFB (DZ06 and DZ07) were sampled by EPA at the

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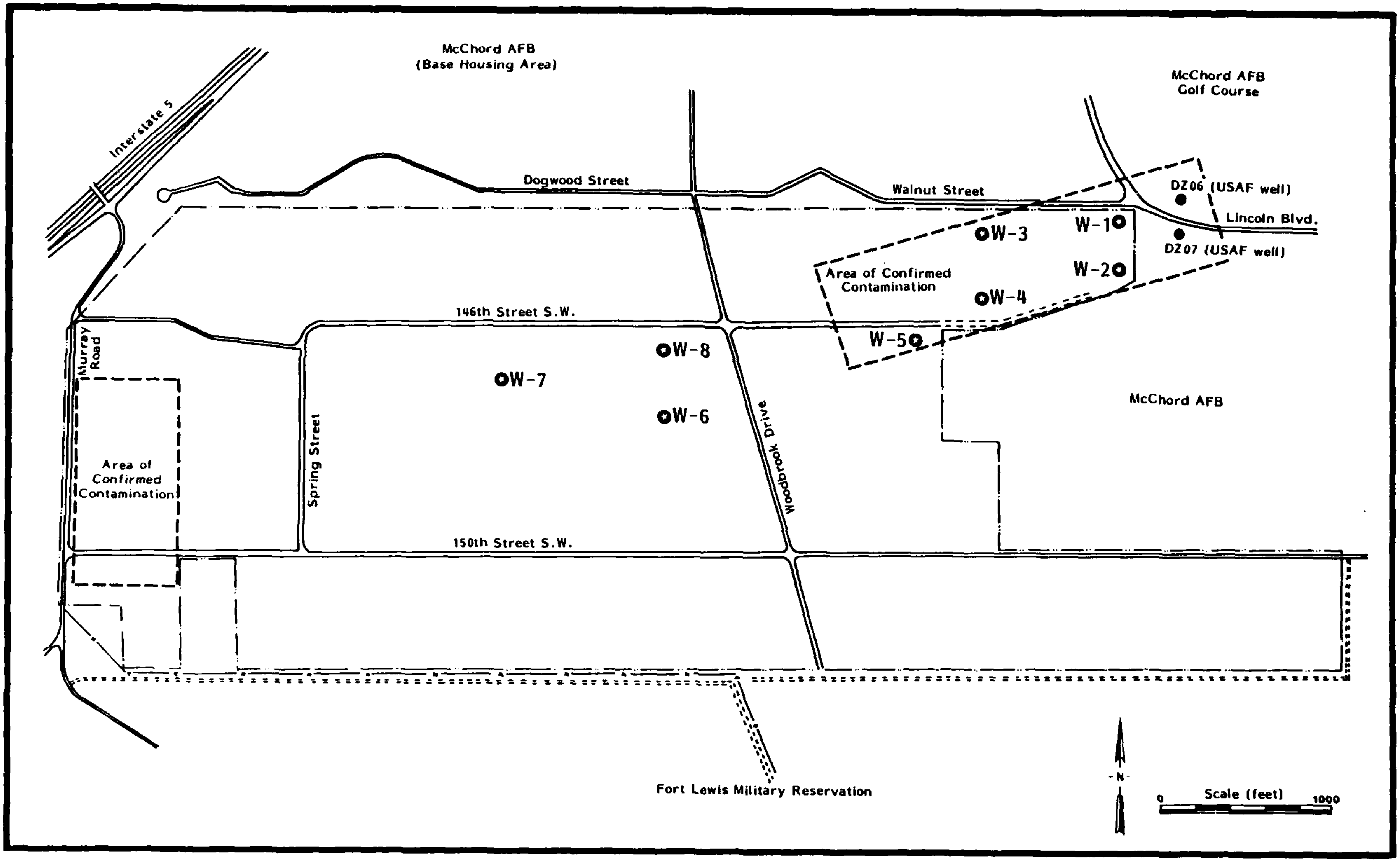

Figure 4

LOCATION OF U.S. EPA MONITORING WELLS IN THE AMERICAN LAKE GARDEN TRACT AND AREAS OF CONFIRMED OR SUSPECTED GROUNDWATER CONTAMINATION

same time as the American Lake Garden Tract monitoring wells. Of the 19 wells sampled, 10 were found to be contaminated. The highest concentration of 1,2-trans-dichloroethylene (133.0 ug/l) was measured in McChord AFB Well DZ07. The hydrocarbon 1,2-trans-dichloroethylene was also quantified in EPA Well W1C (123.0 ug/l), Well W4C (88.0 ug/l), Well W4B (86.0 ug/l), Well W1B (8.4 ug/l), and Well W5 (5.2 ug/l), and Air Force Well DZ06 (106 ug/l). Significant concentrations of trichloroethylene were found in EPA Well 1C (10.0 ug/l) and McChord AFB Wells DZ06 (7.0 ug/l) and DZ07 (5.1 ug/l) (Ecology and Environment, 1984). The EPA-funded study concluded that groundwater is contaminated before it reaches the American Lake Garden Tract and that groundwater flow is to the west. The report also states that the contamination probably originates on McChord AFB upgradient of Wells DZ06 and DZ07.

Since the release of the report of the EPA investigation in the American Lake Garden Tract, the Air Force has agreed to take the necessary steps required to identify the source of groundwater contamination, define the extent of off-base contamination, and identify cleanup alternatives as appropriate. The Air Force has been supplying bottled water to 51 families in the American Lake Garden Tract and has sampled domestic wells in the Garden Tract for organics on a quarterly basis since March 1984. USAF results of the quarterly sampling and analysis of water from domestic wells indicate that a contamination problem also exists at the western extreme of the American Lake Garden Tract (see Appendix H.2).

1.6 OBJECTIVES OF THE REMEDIAL INVESTIGATION

Groundwater contamination has been identified in the American Lake Garden Tract where the only domestic water supply is from groundwater. IRP and other environmental monitoring programs have confirmed the presence of groundwater contamination on both Air Force and Army installations bordering the Garden Tract, and in the northeast and the southwest corners of the American Lake Garden Tract. The purpose of this IRP Phase II investigation in the American Lake Garden Tract is to accomplish the following:

- Determine the areal extent and vertical distribution of the contaminants.
- Determine the hydrogeologic systems which exist beneath the study area through geophysical and geologic interpretations.

- Determine the possible contaminant source areas and the potential for migration of those contaminants.

- Investigate potential feasible remedial alternatives to eliminate contaminant sources and restore groundwater quality.

This effort will consolidate previous and ongoing individual efforts by the U.S. Air Force, U.S. Army, and the U.S. EPA and will present the available information in a single interpretation.

2.0 ENVIRONMENTAL SETTING AND RECORDS SEARCH

2.1 LOCATION

The American Lake Garden Tract is located in the northern halves of Sections 22 and 23, Township 19 North, Range 2 East in western Pierce County, Washington. It is located approximately 10 miles southwest of the City of Tacoma. This primarily residential community shares its boundaries with military installations on all sides. McChord AFB occupies the land to the north and the east of the American Lake Garden Tract and the Fort Lewis Military Reservation shares the southern and western boundaries.

2.2 DEMOGRAPHICS AND LAND USE

Based on 1980 census data, the population of the American Lake Garden Tract is approximately 3,000. The area was originally settled as a small farming community at about the turn of the 20th century (Green, 1985) and is now occupied by apartment complexes, mobile home parks and single family residences which are occupied primarily by Army personnel (Legg, 1985). There is a small commercial development in the American Lake Garden Tract which houses a grocery store, a barber shop, a laundromat, fast food drive-in, and an automobile repair shop which no longer retails gasoline. This commercial area is located south of the intersection of Lincoln Boulevard and Woodbrook Drive (see Figure 5). There are four other commercial operations within the American Lake Garden Tract including an insurance sales office and gas station/auto repair shop on Woodbrook Drive near 148th Street S.W., and a transmission repair shop and the Woodbrook Flea Market on Murray Road. In addition to these commercial operations there are two schools located in the American Lake Garden Tract. They are the American Lake Secondary School and the Woodbrook Junior High School. Finally, several equestrian riding and boarding facilities are located along 150th Street S.W. in the southeast corner of the American Lake Garden Tract.

2.3 PHYSICAL GEOGRAPHY AND METEOROLOGY

The American Lake Garden Tract is a relatively flat residential community located on the Tacoma upland plain five miles east-southeast of Puget Sound.

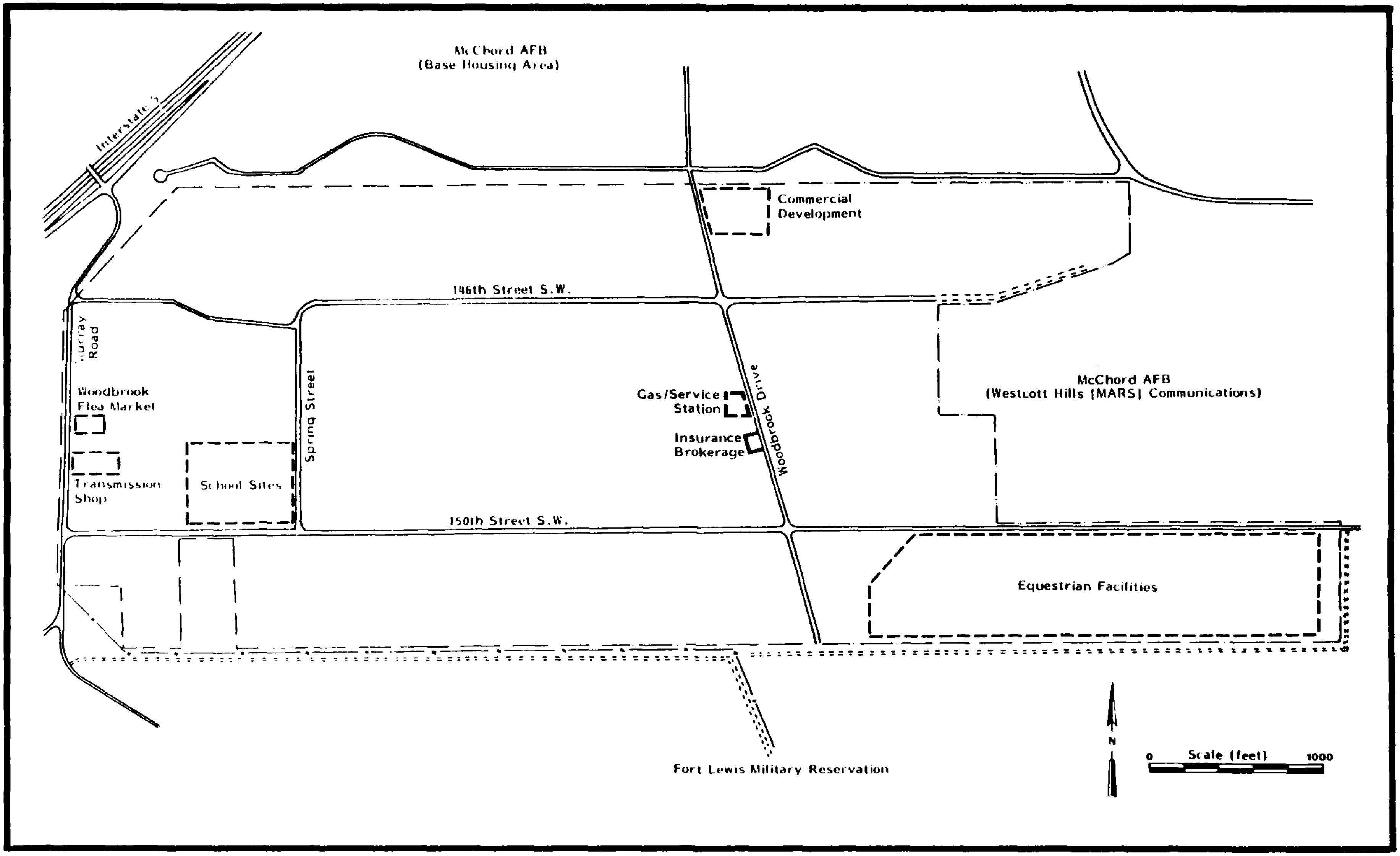

Figure 5

LOCATION OF COMMERCIAL AND NON-RESIDENTIAL DEVELOPMENTS
IN THE AMERICAN LAKE GARDEN TRACT

The tract is rectangular in shape and covers approximately 0.6 square miles. Elevations of the land surface in the tract range from 325 feet above mean sea level (MSL) in the eastern portion to 275 feet above MSL on the western boundary. The Garden Tract is located on the western flank of Westcott Hills. The surrounding areas to the north, west, and south are flat. There are no continuously flowing drainage channels within the tract; however, a broad swale runs generally east to west through the Garden Tract.

The climate in the American Lake Garden Tract is influenced by Puget Sound and the Olympic and Cascade Mountain Ranges. Winter temperatures seldom drop below freezing while summer temperatures generally remain below 80°F. The average frost-free growing season is about 250 days. Mean annual precipitation is approximately 39 inches per year, with two-thirds of the yearly rainfall occurring between October and March. High winter rainfalls combine with the low seasonal evaporation potentials and result in increased surface runoff and aquifer recharge. Annual evapotranspiration is estimated to be 20 inches annually at the Puyallup Experiment Station approximately 13 miles east of the study area. Assuming that the soil capacity at American Lake Garden Tract ranges from six inches to two inches, and based on annual average precipitation, net annual infiltration to groundwater is estimated to be 13 to 17 inches.

2.4 PHYSICAL GEOLOGY AND HYDROGEOLOGY

2.4.1 Geologic Structure and Unit Formations

The American Lake Garden Tract is located in Pierce County in the central part of the Puget Sound Lowland physiographic province of western Washington. The Puget Lowland is a long, narrow, north-south trending structural lowland in a broad young downwarp between the Cascade and Coast Range uplifts. Structurally, the basin is a complex system of Cenozoic folds and faults that trend perpendicular to the regional downwarp (McKee, 1972).

Surficial geologic units in the American Lake Garden Tract are primarily related to environments of deposition associated with continental glaciation in the Puget Sound region. Glacial deposits from the most recent glaciation (Vashon) support the primary water supply aquifers which are tapped for private

and public use in the Garden Tract. Less permeable surficial materials (aquicludes and aquitards) are important in determining the distribution of groundwater and may affect the dispersal of groundwater contamination.

At the onset of the Vashon advance, glacial ice flowing down from Canada encroached on the Straits of Juan de Fuca and cut off Puget Sound from communication with the Pacific Ocean. As a result of the discharge from large meltwater streams flowing south, portions of the Puget lowland were covered by a lake. Sediments deposited in this large proglacial lake were predominately silts and clays that have been called the Lawton Formation. They overlie the interglacial Kitsap Formation which also consists primarily of fine-grained sediments. In the Garden Tract study area the Lawton and Kitsap Formations may form a barrier to groundwater flow.

As the Vashon glacier advanced, the proglacial lake filled with sediment and was covered by sands and gravels (Esperance Formation) carried by broad meltwater streams. These sands and gravels have high permeability and are an important source of groundwater in the American Lake Garden Tract area. As the glacier continued to advance, it overrode the Esperance Formation and deposited glacial till beneath the ice. The Porter Hills and the Westcott Hills on McChord AFB are examples of hills that have been sculptured by glacial activity and covered by Vashon till. Distribution of glacial till may be discontinuous due to lack of original deposition or due to later removal by erosion. Till is relatively impermeable and where present may form a barrier to groundwater flow. Approximately 14,500 years ago, Vashon ice reached just south of the present position of Olympia before it began to retreat. Retreat of the ice was rapid and the Straits of Juan de Fuca were once again free of ice by about 12,500 years ago.

During retreat of the Vashon glacier, surficial deposits accumulated from meltwater streams associated with the stagnant ice, from the overflow of glacial Lake Puyallup (Steilacoom gravels), and from the deposition of materials carried directly within the ice (ablation till). These sediments were deposited around large stationary blocks of ice which upon melting formed topographic depressions. Several lowland ponds and marshy areas in the study area are geologic kettles created by the past presence of detached ice blocks.

Deeper depressions which today intersect the groundwater table contain lakes such as American Lake. Successively lower outlet channels from glacial Lake Puyallup, to the east of the subject site, were uncovered as the Vashon ice retreated. Water issuing from Lake Puyallup first spread over the American Lake Garden Tract from the east, then from the northeast, and finally from the north as lower outlet channels were exhumed. Discontinuous silt layers within the Steilacoom gravels reflect variations in the energy of the transport medium and the reworked glacial source materials. These fine-grained layers locally produce perched groundwater tables and may affect the dispersal of contaminants.

Well logs from boreholes within and around the American Lake Garden Tract indicate the region is in fact underlain by a variable sequence of surficial recessional outwash overlying glacial till overlying advance outwash or sand (JRB Associates, 1983; Science Applications International Corporation, 1985; Ecology and Environment, 1984; U.S. Corps of Engineers, 1984 and 1985; WDOE files) . The variability of the sequence is demonstrated by the absence of till in some boreholes, or the presence of substantial sand units within the till (Ecology and Environment, 1984). It is unlikely that there is a major sand unit within the till, as it would mean a re-advance of the Puget Lobe had to have occurred to form the upper till unit. The sands previously encountered within the till are most likely only signs of meltwater stream channels occurring as sand lenses. Boring logs for domestic and community supply wells in the American Lake Garden Tract and for monitoring wells installed on McChord AFB indicate the glacial till is a fairly continuous unstratified deposit of silty gravel. South of the Garden Tract, however, there appears to be an increasing absence of the till according to boring logs from WDOE and Fort Lewis. This might be due to the fact that the terminus of the Puget Lobe was south of what is now the city of Olympia, and relatively close to the study area. McKee (1972) suggests that the glacier did not occupy this maximum position for very long and, as it started to recede, meltwater streams began eroding sediments left in the lowland from lacustrine deposition, direct glacial deposition, or episodal discharges of sediments from glacial Lake Puyallup.

The Pleistocene geologic section in the American Lake Garden Tract study area (see Figure 3) has been divided into seven hydrostratigraphic units recently

designated A to G (Brown and Caldwell, 1983). The "A" unit includes deposits above the Kitsap Formation (Unit "B") and chiefly include the Vashon deposits. Previous research and field investigations by the principal authors concluded that there are at least six geologic units of interest underlying McChord AFB, the upper five of which comprise the "A" unit. It can be expected these same shallow units may be encountered in the American Lake Garden Tract. The units are as follows:

- Quarternary Alluvium - The ground surface at the American Lake Garden Tract is typically mantled with a deposit of Spanaway gravelly sandy loam. The loam mantle is missing in several areas, most frequently a result of human activities. This surface unit is loose and is generally very permeable. This material will allow the rapid infiltration of precipitation or other liquids into the underlying subsurface materials.

- Steilacoom Glacial Outwash Deposits - The quarternary alluvium is underlain by Steilacoom gravels. These were deposited in large glacial meltwater streams or drainage from glacial Lake Puyallup that flowed westward across the area during the retreat of the Puget Ice Lobe (Walters and Kimmel, 1968). This unit can be typically described as gravel; or gravel, cobbles, and boulders with lesser amounts of brown sand, silt and clay forming an unconsolidated matrix. Drilling records and exposed outcrops of this unit reveal that the unit is stratified and that sand-dominant layers and clay lenses are present. The relative densities indicated by the N-values (standard penetration resistance) on boring logs also testify to the variable nature of this unit. The lateral extent of the sand and silt units is not widespread. The vertical and horizontal permeability of this unit is high in most locations; however, the migration route of percolating water or horizontal flow of groundwater could be tortuous. Perched water tables contained by layers of clay and silt possessing low permeability can be expected to be very local due to the limited lateral extent of any such units.

- Vashon Till - Frequently underlying the glacial outwash material is the glacial till. The till can be described as lodgement till in that its structure is depositional in character. This unsorted mixture of clay, silt, sand, gravel, cobbles and boulders was overriden by the advancing ice sheet and compacted by its weight.

  The till is grey to brown and has the general appearance and characteristics of concrete. This unit is characterized by its high density. The N-values of this material are typically greater than 100. This dense, thick unit creates resistance for vertical and horizontal groundwater and contaminant flow. In this respect the till becomes an important hydrogeologic unit in the American Lake Garden Tract because it affects groundwater movement in both a

vertical and horizontal direction. In the absence of fractures or discontinuities, the till unit serves as a relatively impermeable barrier to the flow of water.

Silt is generally the dominant constituent in the tills, even though variations in components range from gravel-rich to clay-rich zones. Some of these zones appear to have some restricted lateral extent. Numerous clean sand and gravel layers have been encountered within the lodgement till in the borings completed in the northwest corner of the base, in the Ponders Corner area of Lakewood and in the American Lake Garden Tract (JRB Associates, 1983; Ecology and Environment 1984). These relatively permeable deposits, which would probably be considered minor lenses of outwash within the relatively impervious lodgement till, have low water yields.

- Esperance Formation - The Esperance Formation, also called the Colvos sand, can be considered an advance deposit. This fine-grained sand unit lies beneath the Vashon Till and is laterally continuous across much of Central Pierce County (Brown and Caldwell, 1983). Permeability is high in this material. The Esperance Formation is encountered in all water supply and monitoring wells on McChord AFB which penetrate through the Vashon Till. The Esperance sand unit serves as the principal water supply aquifer for McChord AFB, the adjacent Lakewood Water District supply Wells H-1 and H-2, Fort Lewis Military Reservation, the Tilicum Water District, and numerous other public and private supply wells. The upper surface of the Esperance Formation is frequently encountered 70 to 100 feet below the ground surface. The sand unit has been measured to be as thick as 150 feet. Ideally suited as a major aquifer, it is susceptible to pollution from the ground surface through fractures or discontinuities within or absence of the Vashon Till.

- Lawton Formation - The Esperance sand unit is underlain by a blue clay layer approximately 180 to 200 feet below the ground surface. The clay layer is believed to have been deposited in the proglacial lake formed when the advancing glacier dammed the north end of the Puget Sound Lowland (Brown and Caldwell, 1983). This clay layer was found to be two to four feet thick in two borings at the north end of McChord AFB during the IRP Phase II (Stage 1) drilling program (JRB Associates, 1983). Its presence has also been confirmed in water supply wells in the central and west areas of McChord AFB, and in numerous borings throughout the region. This clay unit may act as a contaminant migration boundary.

- Kitsap Formation - The Kitsap Formation has been observed beneath the blue clay layer. This unit consists primarily of sandy silt with scattered layers or lenses of gravelly clay and sand. The Kitsap Formation is reported as being composed of beds of fluvial and marsh facies deposited during the Pleistocene Epoch. The Kitsap Formation is recognized in the project area by the yellowish-orange oxidation of the silts and gravels (Walters and Kimmel, 1968). Pump tests on this formation in nearby wells found it to

have a low yield (<200 gpm) (Robinson and Roberts, 1959). The McChord AFB IRP Phase I report indicates, however, that many public water supply wells in the formation are capable of producing greater than 300 gpm (CH2M Hill, 1982). Only two wells in the McChord AFB IRP Phase II (Stage 1) investigations were drilled deep enough to encounter this formation (JRB Associates, 1983).

A review of available boring logs for local wells indicate that two water-bearing zones exist within the upper 225 feet. The first consists of the Steilacoom outwash material which lies between the regional groundwater level and the top of the Vashon Till; permeability of this unit appears to vary laterally but, in general, it can be considered to be high. Groundwater flow is frequently tortuous. Based upon static water level measurements, groundwater generally moves in a northwest direction under a gradient of approximately 10 feet per mile. The other important water bearing unit is the Esperance Formation located just below the Vashon Till. This unit has been encountered consistently throughout the McChord AFB study area at a depth of 70 to 180 feet. That these two water bearing units are part of the same aquifer and thus interconnected is suggested by the equivalent hydrostatic head encountered in the sand and outwash units during drilling at McChord AFB, on the Fort Lewis reservation, and in nested wells constructed in the Garden Tract during the 1983 EPA groundwater investigations.

2.4.2 Groundwater Quality

The American Lake Garden Tract is in the western portion of the Chambers Creek/Clover Creek Drainage Basin in Pierce County. This basin is over 82,000 acres in area and has a current permanent population estimated at 150,000. The groundwater beneath the basin is extensively utilized and represents the source of public drinking water for the population of the basin (Littler, et al., 1981).

The suburban population in the Clover/Chambers Creek basin is one of the largest unsewered populations in the United States. Sewage disposal for most of the residential and commercial properties is accomplished through subsurface disposal, almost all of which is via septic tanks. The gravelly soil found throughout much of the basin readily accepts septic tank effluents. However, the pollutant retention or treatment capability of gravelly soils is limited.

As a consequence, water quality problems due in part to subsurface wastewater disposal are documented in state records as long ago as 1939 (Brown and Caldwell, 1983).

Evaluation of water quality data collected between 1950 and 1981 for the Chambers/Clover Creek basin has identified deteriorating groundwater quality at previously unanticipated levels, including wide-spread low level contamination of groundwater by coliform bacteria, phosphates, chlorides, and nitrate-nitrogen (Littler, et al., 1980, 1981). The greatest incidence of bacterial contamination has occurred in residential areas south and east of Spanaway, a small community approximately five miles east and generally hydraulically upgradient of the American Lake Garden Tract (Littler et al., 1981). Bacterial contamination was found in the southeast corner of the Garden Tract in addition to phosphate concentrations greater than 0.5 mg/l. Chloride contamination, however, is less pronounced beneath and west of the Garden Tract than in groundwaters to the east or north where dissolved chloride concentrations generally exceed 10 mg/l and in selected wells exceed 20 mg/l including some in the Lakewood/Ponders Corner area. Finally, nitrate nitrogen appears to correlate with dissolved chlorides and ranges from 2.2 to more than 5 mg/l in groundwaters east and north of the American Lake Garden Tract.

Groundwater contamination near the American Lake Garden Tract by organic pollutants was indicated in the 1980-1981 water quality survey by Littler, et al. (1981). Groundwater in Well H-1 belonging to the Lakewood Water District was the only sample of six with confirmed contamination to be near the American Lake Garden Tract. This sample was analyzed by EPA Region X chemists and was found to contain 61 ug/l of 1,2-trans-dichloroethylene, less than 10 ug/l trichloroethylene, and 18 ug/l tetrachloroethylene (Littler, et al., 1981).

The Lakewood Water District's Wells H-1 and H-2 became a designated site on EPA's National Priority List based upon subsequent testing and confirmation of chlorinated organics contamination. Beginning in late 1981, the EPA, with contractor support, installed more than 20 monitoring wells in the area, including three on McChord AFB (Wolf et al., 1982). Wells 12, 13, and 14 were installed to intercept flow between alleged disposal sites on McChord AFB and the Lakewood Water District production wells. None showed significant contamination by the target compounds (Wolf et al., 1983).

A search and inventory of commercial and industrial activities in the area ultimately led to the discovery of a commercial dry cleaning establishment which had been disposing waste solvents, including tetrachloroethylene, through its septic tank and drain field. This commercial inventory, together with the more comprehensive industrial records search conducted for the Tacoma-Pierce County Health Department (TPCHD), identified more than 30 activities east and west the American Lake Garden Tract which use chlorinated solvents and other potentially hazardous materials in their work activities (Brown and Caldwell, 1983). The EPA has continued to provide technical assistance to the water district a l, under the Superfund program, has installed two forced-air stripping towers adjacent to the pumphouse (Shilling, 1985).

Follow-on monitoring to the 1981 work by Littler, et al. in the American Lake Garden Tract confirmed the presence of low molecular weight chlorinated organics, primarily trichloroethylene and 1,2-trans-dichloroethylene. In February, 1983 the TPCHD conducted a survey of private water supplies and found several homes with bacteriological and chlorinated hydrocarbon groundwater contamination. The U.S. EPA responded to these findings in late 1983 by conducting field investigations which included the construction of 17 monitoring wells in eight separate locations (refer to Figure 4). The wells were screened in zones of contamination detected by organic vapor analyzer (OVA) instrumentation, or in distinct water bearing units separated by glacial till (Ecology and Environment, 1984). This investigation was undertaken simultaneously with a portion of the IRP Phase II (Stage 2) investigations at McChord AFB. Based upon the distribution of contaminants and an apparent groundwater gradient extending from the northeast corner of the tract to wells located west of center, the EPA concluded that groundwater flows west across the American Lake Garden Tract and that the source of chlorinated hydrocarbon groundwater contaminants is probably on Air Force property.

Without admitting any wrongdoing or knowledge of a contaminant source, the Air Force, as an interim measure to protect the public health, is currently supplying bottled water for drinking purposes to 51 families in the American Lake Garden Tract. The U.S. Army is conducting on-site investigations to the south and west of the residential area to confirm the presence and type of any groundwater contaminants (McMaster, et al., 1983; Miller, 1984). In part a

result of this monitoring effort, a second area of elevated chlorinated organics has been detected at the west end of the American Lake Garden Tract (Binovi, 1984; Miller, 1985). As of March, 1985, it had not yet been determined if this contamination was related to that in the eastern end, or if new sources as yet unidentified may be responsible for the observed contamination.

2.5 SURFACE WATER QUALITY

Surface water quality in the Clover/Chambers Creek drainage basin is notably influenced by land use practices and to a lesser extent by groundwater discharge. Many stretches of the creek have been artificially channeled. Potentiometric surface maps indicate that throughout most of its length Clover Creek is a discharge zone for the basin's shallow groundwater system (Brown and Caldwell, 1983). Littler, et al. (1981) report that turbidity and total dissolved solids in Clover Creek vary widely along 13 water sampling stations. Nitrate-nitrogen was measured in Clover Creek at concentrations capable of accelerating eutrophication. Coliform bacteria concentrations in Clover Creek generally exceeded the Class A standard of 100 colonies per 100 ml. This contamination, plus elevated chloride concentrations and previously discussed observations on elevated turbidity and solids, suggest adverse impacts from urban runoff. The concentrations of dissolved constituents measured in Clover Creek relative to other parts of the drainage are suggestive of inputs from septic tank leachate.

Limited surveys of water quality in Murray Creek are performed near the Industrial Wastewater Treatment Plant at the Logistics Center by the Army Environmental Hygiene Agency (Miller, 1985).

2.6 WILDLIFE HABITAT AND SPECIES

The American Lake Garden Tract and grounds of McChord AFB (and Fort Lewis to the south) include numerous habitat types for aquatic and terrestrial wildlife species.

The western Pierce County area is chiefly a moist region with cool summers composed of dense forests of Douglas Fir (*Pseudotsuga menziesii*), Pacific red cedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*). A portion of

this region within the Tacoma upland, however, is better drained and thus exhibits drier conditions. This area is better known as the Tacoma Prairie. Clusters of gary oak (Quercus garyi) are common throughout this prairie habitat. Along the lowlands and ravines throughout are stands of cottonwoods (Populus balsamifera), willows (Salix sp.) and alder (Alnus sp.).

The land adjacent to McChord AFB and to the south near Fort Lewis include numerous habitat types for aquatic and terrestrial wildlife species. Fish present in this area include native and introduced species. Clover and Morey Creeks on McChord AFB, and Murray Creek on Fort Lewis, are inhabited by several native species including cutthroat trout (Salmo clarki), three-spine stickleback (Gasterosteus aculeatus), suckers (Catostomus sp.), sculpin (Cottus sp.), western brook lampreys (Lampetra richardsoni), and redside shiner (Richardsonius balteautus). A culvert beneath the bridge at Steilacoom Boulevard represents the limit of anadromous fish passage and thus precludes the presence of coho salmon (Oncorhynchus kisutch) and steelhead (Salmo gairdneri) on McChord AFB. Introduced fish in the streams or ponds of the study area include rainbow trout (S. gairdneri) and yellow perch (Perca flavescens).

Both McChord AFB and especially the wetlands of Fort Lewis provide ample habitat for nesting and migratory waterfowl. Nesting species regularly observed in these aquatic habitats include Mallard (Anas platyrhynchus), American Widgeon (A. americana), Canada Goose (Branta canadensis), and Wood Duck (Aix sponsa). This area is particularly important for migratory and overwintering waterfowl which include American Widgeon (A. americana), Ring-necked Duck (Aythya collaris), Bufflehead (Bucephala albeola), Pintail (A. acuta), Common and Barrows Goldeneye (B. clangula and B. islandica), Ruddy Duck (Oxyura jamaicensis), Common and Hooded Mergansers (Mergus merganser and Lophodytes cuculatus), and Grebes (Podiceps sp.).

In addition to the many species of waterfowl found in the wetlands of this vicinity, numerous birds of prey including owls and hawks, shorebirds, and passerines, common to western Washington, can also be found throughout McChord AFB and Fort Lewis within their preferred habitat. Gallinaceous birds, such

as California Quail (Lophortyx californicus) and Ruffed Grouse (Bonasa umbellus) can be found in the area's grasslands and woodlands respectively.

Mammals known to occur in McChord AFB and Fort Lewis area's wetlands include river otter (Lutra canadensis), beaver (Castor canadensis), muskrat (Odontra zibethica), and mink (Mustela vison). Mule or blacktail deer (Oedocoileus hemionus), raccoon (Procyon lotor), coyote (Canis latrans), and numerous representatives of Talpidae (mole family) and Rodentia (squirrels, mice, voles, and rats) occur in its uplands and woodlands.

At this time, there are no federally listed endangered species known to occur within the study area. The threatened northern American bald eagle (Haliaeetus leucocephalus) overwinters and breeds in the Fort Lewis and McChord AFB area; two nest sites have been identified on Fort Lewis (J. Stevenson, pers. comm., March 1985). The white-topped aster (Curtis aster), currently a candidate for the federal endangered plant list, is known to occur on both McChord AFB and Fort Lewis properties.

While no studies have been conducted to determine if any environmental stress is occurring on base to wildlife or their habitat, there is no known impact to aquatic life and only localized impact to vegetation in the areas of surface spills or land disposal sites not yet covered by grass or trees. Sites with stressed vegetation were identified in the Phase I records search and became a part of the IRP environmental response.

2.7 REGIONAL RECORDS SEARCH

The records search of the American Lake Garden Tract area included interviews with 24 individuals and a thorough search of past and present land and water use records for the Garden Tract and surrounding military facilities. A list of interviewees is contained in Appendix A. The results of these research activites are presented below by geographic area and military installation.

2.7.1 American Lake Garden Tract

Public records and interviews with persons familiar with the American Lake Garden Tract indicate that the area was originally settled as a small farming

community in the early 20th Century. Very little growth occurred until the 1960s when the demand for economical housing for military personnel increased. Most of the military personnel who reside in the American Lake Garden Tract are associated with the United States Army and are assigned to the Fort Lewis Military Reservation.

In an effort to locate either past or present sources of groundwater contamination, SAIC investigators reviewed records belonging to the Pierce County assessor, auditor/recorder, planning department, public works department, and the health department. Information gathered from these records and interviews with personnel from these offices indicate there have been no known industrial activities within the American Lake Garden Tract. Commercial activities within the tract have historically been and are presently limited to three gasoline service station or auto repair shops, a grocery store, a barber shop, an insurance brokerage, a laundromat, a fast food restaurant, and several equestrian riding and boarding facilities.

Reports were never confirmed of post-World War II military equipment storage on private property south of 150th Street S.W. and west of Woodbrook Drive. Neither was an aircraft smelting operation confirmed, alleged to be on U.S. government property southeast of the American Lake Garden Tract. Aerial photographs taken between 1941 and 1984 above the areas of these alleged activities were interpreted and the ground surface was examined by careful walking. However, no evidence of either activity was discovered as would be indicated by changes in landform, physical debris, or stressed ecological conditions. An abandoned railroad bed and trackage which crosses the eastern extension of 150th Street S.W. near the current Burlington Northern Railroad main line is believed to be an old rail spur which deadended within or east of the Mount Rainier Ordnance Depot (now known as the Fort Lewis Logistics Center).

2.7.2 McChord AFB Remedial Investigations

Ten general areas of concern at McChord AFB have been investigated as potential sources of environmental contamination. Figure 6 identifies these areas which are described briefly in the following paragraphs. Greater detail is provided for those areas closest to the American Lake Garden Tract. For a more thorough discussion of all areas, the reader is directed to the IRP Phase II (Stage 2) investigation by SAIC (1985).

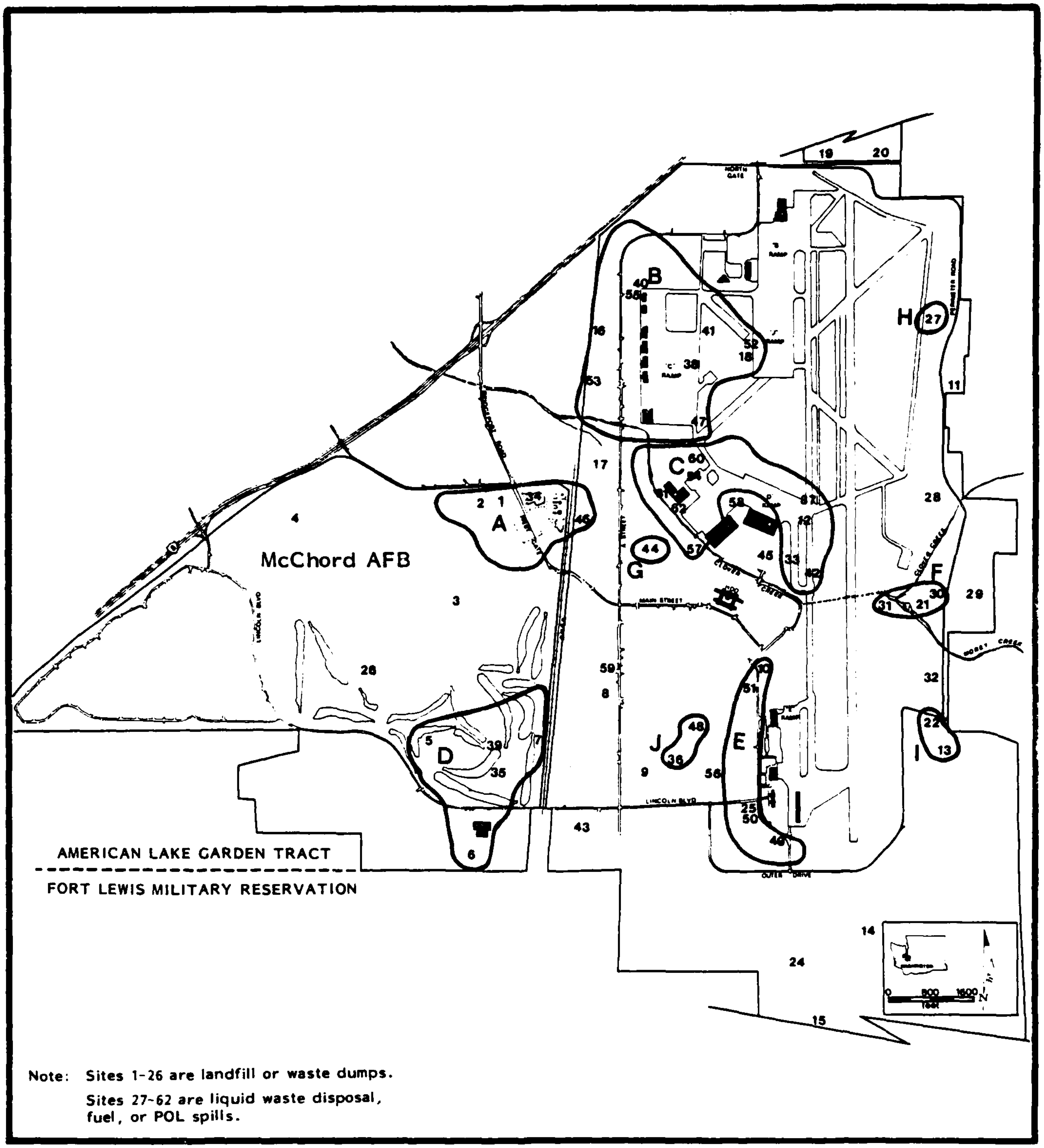

Figure 6

LOCATION OF 10 GENERAL DISPOSAL AREAS (A-J)
AND THE INDIVIDUAL DISPOSAL SITES AT
McCHORD AFB, WASHINGTON

SAIC

* Area A is located in the north central portion of the base. Industrial demolition debris and domestic refuse was buried in two landfills west of Bridgeport Way, the main access road to the base. Bulk fuel storage is located east of the road. Fuel spills, uncontained drainage of aircraft fuel filters and disposal of fuel storage tank bottoms has occurred in this area. Area A is also the closest of base disposal sites to the off-base chlorinated hydrocarbon contamination problems in two water supply wells for the Lakewood Water District. IRP Phase II investigations within Area A have included: (1) the installation of six groundwater monitoring wells; (2) a 5,500 linear foot seismic refraction survey; (3) measurements at five electrical resistivity stations; (4) in situ measurements of pH, specific conductance and temperature; (5) multiple water level soundings; (6) collection and archival of 69 soil samples taken during drilling; (7) collection of more than 30 water samples and the performance of more than 60 chemical analyses.

  Chemical characterization of the groundwater indicates that Area A contamination is not related to the Lakewood water supply problems. Remedial action has been recommended to reduce the risk of contamination of domestic water supplies. Lining of and other improvements to the tank farm and cessation of draining fuel filters on the ground surface have been implemented to reduce the potential for future contamination. Remedial alternatives which were suggested to improve present groundwater quality and reduce existing contamination include: (1) geophysical surveys to define the extent of groundwater contamination; (2) design and installation of a well field with dewatering pumps and scavenger collectors; (3) well point dewatering system and oil/water separation; (4) submersible pump drawdown and recovery system with oil/water separation; and (5) a long-term groundwater monitoring program.

* Area B is comprised of six liquid waste disposal sites behind and along MAC "B" ramp aircraft maintenance facilities. Trace level contamination of groundwater in Area B was confirmed during IRP Phase II investigations and is indicative of base activities associated with aircraft operations, equipment maintenance and rehabilitation, and base engineering support. Long-term monitoring is recommended.

* Area C is comprised of seven sites caused by the spill or discharge of waste petroleum, oils or lubricants (POL); solvents; or fuels. One of the sites, Site 54, is an aircraft wash rack facility recently nominated by the U.S. Environmental Protection Agency (EPA) for inclusion on the National Priorities List of hazardous waste sites. POL recovery and long-term monitoring is recommended.

* Area D contains several waste disposal sites west of the Burlington Northern Railroad (BNRR) right-of-way. Three landfills were suspected of containing industrial and domestic wastes, and construction or demolition debris. At least one site (Landfill No. 5) is reported to have received waste POL, solvents, or fuels (CH2M HILL, 1982). Additional sites not rated by HARM included numerous ordnance disposal sites and ordnance burn pits. IRP Phase II confirmation activities in Area D have included: (1) the performance of a

12,500 linear foot seismic refraction survey; (2) geophysical measurements at nine electrical resistivity stations; (3) the installation of six 2-inch ID monitoring wells and five 6-inch ID observation/recovery wells; (4) in situ measurements of pH, spe ific conductance and temperature; (5) multiple water level soundings; (6) performance of a 12-week time series sampling on the pump-stressed aquifer; (7) collection of more than 30 groundwater samples and performance of more than 100 chemical analyses on these samples.

Area D includes those Air Force Base waste disposal sites closest to the American Lake Garden Tract. Two sampling events intended to confirm off-base contamination in the vicinity of Area D were performed in the Garden Tract IRP Phase II during Stage 2 studies. Remedial alternatives suggested in the Stage 2 report included: (1) additional electrical resistivity and seismic refraction geophysical surveys within Area D and the American Lake Garden Tract in order to further define subsurface geologic and hydrogeologic conditions; (2) the performance of soil gas surveys in an attempt to locate contamination; and (3) continued groundwater monitoring in USAF and EPA wells for volatile organics, specific conductance, iron, and nitrate nitrogen.

- Area E consists of one landfill and three liquid waste disposal sites along the industrial operations and aircraft facilities at the south end of the instrument runway. This area is hydraulically upgradient of Area D and the American Lake Garden Tract. Stressed vegetation, strong soil odors, and groundwater monitoring have indicated contamination problems. IRP Phase II on-site investigations have included: (1) installation of five two-inch ID monitoring wells; (2) in situ measurements of groundwater pH, specific conductance and temperature; (3) multiple water level soundings; (4) and the performance of a simulated surface spill using a brine solution. Suggested remedial improvements for Area E focused on engineering improvements of the fueling and defueling facilities to prevent future contamination, and implementation of a long-term monitoring program for volatile organics and heavy metals.

- Area F is located east of the runway and near the confluence of Morey and Clover Creeks. It is comprised of two abandoned fire training burn sites where waste POL, solvents, and fuel were dumped into unlined pits and ignited. Current fire training exercises take place within Area F in a pit lined with four inches of clay-containing materials. Groundwater monitoring data indicate this area is not impacted by surface activities.

- Area G is located near the base motor pool and consists of several waste disposal sites caused by small spills of waste POL and fuel. This area was not investigated in either of the Phase II studies but does lie between Areas A and C, both of which have groundwater contamination problems associated with fuels and/or waste POL.

- Area H is located east of the north end of the instrument runway and served as a fire training area during a 17-year period beginning in 1960. Waste JP-4 and AVGAS were used to start approximately 24

fires per year in this area. A long-term monitoring program was recommended to establish background water quality.

- Area I is located east of the main runway and south of Morey Creek. It contains two landfills suspected of containing industrial and domestic solid wastes, scrap vehicles, and waste POL. No Phase II confirmation investigations were performed in this area as it was expected that a confirmation of contamination in either Area H or Area F would indicate a problem in Area I. Because no contamination was detected at either site, no field confirmations have yet been performed in Area I.

- Area J includes a storm drain infiltration ditch and a wood preservative tank in the civil engineering yard. Unidentified quantities of waste materials have been noted to drain into the storm drain from the civil engineering yard, including waste paint, oil, fuel, and pesticides. Pentachlorophenol (PCP) wood preservative has been found in the soil beneath the tank. A long-term monitoring program which should focus on volatile organics, heavy metals, and total phenols was recommended.

Finally, a review of aerial photographs made available by U.S. EPA Region 10 indicates at least one waste disposal site in Area D on McChord AFB which was not included in the IRP Phase I report (U.S. EPA, 1984). This site was located east of the American Lake Garden Tract and beneath the present-day Base Housing Gate guard shack. EPA has the site labeled as a waste disposal area on a 1957 photo but noted that both the scale and quality of the black and white photographs preclude a detailed analysis of the waste disposal area. It is likely this site was a sand and gravel borrow pit during the construction of the Lincoln Boulevard housing area. However, long-time residents of the Garden Tract claim to have witnessed disposal of refuse at this site.

2.7.3 Fort Lewis Remedial Investigations

Sites on the Fort Lewis Military Reservation which may be adversely affecting groundwater quality in the American Lake Garden Tract are the Fort Lewis Logistics Center, the Defense Reutilization and Marketing Office [Fort] Lewis (DRMOL) storage facilities, and numerous old landfill and liquid waste disposal or spill sites. The locations of these facilities are presented on Figure 7.

The vehicle maintenance facility in the Fort Lewis Logistics Center performs major repair and overhauling of vehicles, including body work and vehicle

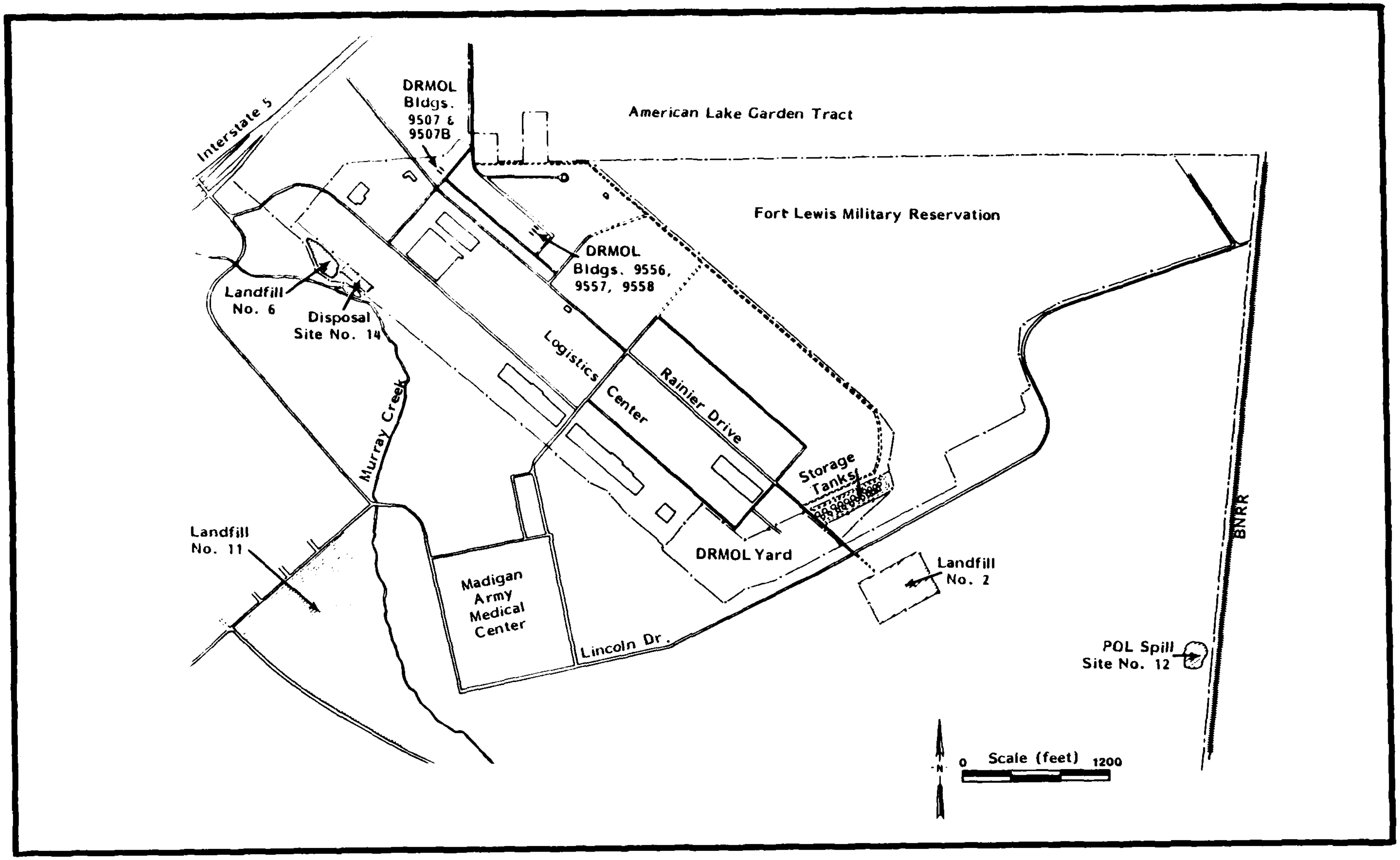

Figure 7

LOCATION OF WASTE STORAGE AND DISPOSAL SITES ON OR NEAR THE FORT LEWIS LOGISTICS CENTER

SAIC

painting, engine overhauling, and battery-shop and tire-shop related activities. This work is performed as general service maintenance after organizational motor pools perform lower-level maintenance operations (McMaster, et al., 1983).

A small armament maintenance shop operates in the Logistics Center. Unit operations involve sand blasting, degreasing, acid rinsing, and oil dipping. Furniture is also refinished at the Logistics Center. The refinishing process involves removing the old finish with a commercial paint stripper and then painting or varnishing the stripped surface (McMaster et al., 1983).

The Defense Reutilization and Marketing Office [Fort] Lewis maintains three areas on Fort Lewis for storage of hazardous materials (see Figure 7). All are located at the Logistics Center. The DRMOL yard located at the south end of the Logistics Center includes an area designated for dangerous or hazardous materials that can be stored outside. Typical materials include epoxies, hydraulic fluid, and flammables.

DRMOL also uses Buildings 9556, 9557, and 9558 for storage of hazardous materials. These buildings are located in the northeast corner of the Logistics Center (see Figure 7). Approximately two-thirds of the floor space in Building 9556 is used for storage of oxidizing chemicals while the remainder is used to store reactive chemicals. A sandbag berm separates the chemical storage areas. The floor has curbing to contain spills and leaks, and warning signs are posted outside. Building 9557 contains toxic chemical and caustic corrosive storage areas also separated by a sandbag berm. Building 9558 is used for storage of corrosive acids. The floor is sealed, and curbing has been placed at the outside edges of the floor.

Lastly, DRMOL uses Building 9507B to store waste oils containing polychlorinated biphenols (PCBs) or equipment known to contain PCB-contaminated oils (see Figure 7). The origins of the PCB-contaminated oil or equipment include electrical transformers and capacitors. The Exterior Electric Shop removes and stores out-of-service electrical equipment while analyses are performed to determine the presence of PCBs in the dielectric insulating fluid. If PCBs are confirmed to be present at a concentration which exceeds 50 ppm, then the

dielectric fluids and/or equipment are transferred to Building 9507B. If PCB concentrations are less than 50 ppm, the dielectric oils and/or equipment are disposed of by a contractor. Building 9507B has an epoxy-sealed concrete floor, a spill-containing curb, and posted warning signs.

The U.S. Army has operated and now closed several solid waste landfills and two liquid waste disposal sites south of the American Lake Garden Tract and near the Logistics Center. These landfills and liquid waste disposal sites, all located on Figure 7, are described in the Fort Lewis installation assessment as follows:

- Landfill No. 2 occupied approximately 4 acres and contains possible industrial and sanitary wastes from the former Mount Rainier Ordnance Depot. The landfill was a surface disposal site which operated from 1946 to 1960 near the intersection of East Lincoln Road and Rainier Drive. Four monitoring wells were installed around this site in 1982, but no monitoring data were reported in the IRP Phase I report of the installation assessment. At the time of the installation assessment, a monitoring program for trace metals and organics was being developed.

- Landfill No. 6 is the former disposal site of sludges from the industrial wastewater treatment plant (IWTP) percolation lagoon. Landfill No. 6 is located at Dearborn Avenue and Fifth Street near the northwest end of the Logistics Center. The IWTP provides treatment of Logistics Center industrial wastes including spray paint booth wastewater, rinseates from metal refinishing dip tanks, neutralized waste battery electrolyte, and various floor drains in the Logistics Center maintenance areas (McMaster et al., 1983). The IWTP currently provides treatment of wastewaters from floor drains located within Building 9580 and a steam cleaning facility located at the rear of Building 9580. The IWTP treatment system consists of grit removal, air flotation for oil and grease removal, and settling in a sedimentation basin. Effluent from the system is discharged into a non-overflow evaporation/percolation lagoon. Oil and grease from the air flotation and removal operation is disposed with other waste oils by the Defense Reutilization and Marketing Office [Fort] Lewis.

  The installation assessment reports that Landfill No. 6 was still in operation at the time of the assessment. The site is now closed, however, and industrial sludges are disposed of in the base sanitary landfill (McMaster et al., 1983). It is reported by McMaster et al. (1983) that EP Toxicity evaluations of the IWTP sludges have been performed and the sludges tested have been determined to be non-toxic.

- Landfill No. 11 is reported as a disposal site where rocket motors with propellants have been found. The site is located at Jackson Avenue and Eighth Street west of Madigan Army Medical Center. No

records exist on the types or quantities of materials disposed therein (McMaster et al., 1983). It is of unknown size and the dates of operation are not known.

- POL Spill Site No. 12 is located near the ammunition storage area east of the south end of the Logistics Center. The installation assessment reports that the soil is oil-stained.

- Disposal Site No. 14 was a battery acid electrolyte disposal pit located on the south side of Landfill No. 6. The pit contained limestone which was intended to neutralize the waste acid. During its useful life, the pit was covered with a wooden grate upon which batteries were inverted and allowed to drain. It was reported that the acid disposal pit was accidentally covered with soil in 1982. Samples of the pit were not taken before the closure. The current method of spent battery acid disposal is to containerize it and turn it over to DRMOL for classification and disposal (McMaster et al., 1983).

The installation assessment also identified a solvent refined coal pilot plant (SRCPP) on Fort Lewis which operated from 1972 to 1981. The plant was a lessee industrial operation which involved research and development on coal liquification and solvent refining. Waste generation and disposal records were not kept during the early years of plant operations. The assessment report states that SRCPP purchasing documents indicate that several types of solid wastes were disposed or reclaimed between 1972 and February 1977. These wastes included: off-specification coal and coal dust, off-specification solvent refined coal, sand, activated charcoal, tar-coated rocks and gravel, alum sludge, clarifier skimmings, surge reservoir bottom oil emulsion, excess digested biomass, paper, samples, plant refuse, mineral residue, tank bottoms and used lubricating oils, sulfur, and coal tar naptha. SAIC investigators believe the location of the SRCPP two miles northwest of the American Lake Garden Tract eliminate any suspicions of its contribution to the groundwater contamination problem in the Garden Tract.

3.0 FIELD PROGRAM

3.1 PURPOSE AND PROGRESSION

This investigation was initiated in accordance with the recommendation of the IRP Phase II (Stage 2) Confirmation/Quantification Investigation at McChord AFB and in consideration of concerns expressed by the public health and environmental regulatory agencies. To accomplish the objectives of characterizing groundwater and contaminant distribution patterns in the American Lake Garden Tract, this Stage 1 investigation utilized research tools available in the sciences of geophysics, hydrochemistry, and hydrology. Geophysical investigations included self-potential, seismic refraction, and electrical resistivity. The primary purpose of the geophysical interpretation was to assist in determination of the spatial extent and depth below grade to the top of the glacial till unit. In addition, interpretation of the geophysics data would help identify groundwater elevations and flow directions. The hydrochemical investigations consisted of sampling and analyzing groundwater and soil gas. This information was used to identify possible source areas to determine the vertical and areal extent of contamination and to determine the potential for contaminant migration. The local hydrologic investigation included monitoring water levels. These data were used to determine groundwater flow directions.

A total of 26 new monitoring wells were constructed in the American Lake Garden Tract, Fort Lewis, and McChord AFB areas during this investigation. Water level monitoring and groundwater sampling were conducted at these borehole locations along with preexisting boreholes. Groundwater samples were analyzed in the field for pH, temperature, and specific electrical conductance; in the laboratory, they were analyzed for volatile organic constituents.

The 26 new monitoring wells supplement the 17 wells previously constructed by the U.S. EPA in the Garden Tract, 10 Area D wells on McChord AFB constructed in earlier Phase II studies, and what is now a total of 28 monitoring wells constructed in the Fort Lewis Logistics Center. The U.S. Army constructed 15 wells in the Logistics Center concurrent with the IRP Stage 1 investigations in the Garden Tract. These wells supplement those installed previously within the Logistics Center. SAIC investigators have sounded all new Army wells for

depth to groundwater. In addition, a few of the 10 monitoring wells constructed in the Logistics Center in 1982 were discovered in the field and were sounded for static water levels. Casing elevations for all old and new Army wells are on file and groundwater elevations (as mean sea level) have been computed. Groundwater sampling of Army wells was, however, limited to those wells in the northern one-third of the Logistics Center closest to the American Lake Garden Tract.

3.2 GEOPHYSICAL INVESTIGATIONS

3.2.1 Introduction

A geophysical exploration program was undertaken in the western portion of McChord AFB and the American Lake Garden Tract to map various geological units and the water table. The geophysical program included photo interpretations, self-potential, seismic refraction, and direct current resistivity. Multiple surveys were performed to optimize the data coverage and to add confidence in the data which had different responses to varying geology for each of the geophysical methods. Each of the methodologies is described below.

3.2.2 Photo Interpretations

The development of the field program was initiated with the interpretation of aerial photographs dating from 1941 when the majority of the study area was as yet undisturbed by cultural features. Additional photos examined were those taken in 1948, 1957, 1961, 1967 (Dabney, 1982), and 1984. Wherever available, paired photographs were viewed through a stereoscope to determine the approximate locations of major geomorphological features that indicate post-glacial deposition and erosion near the margin of the latest continental glacier to invade this area. Together with data from local boring logs and monitoring wells, project geologists attempted to define the spatial extent of the glacial till unit and to identify possible erosion channels or cuts through the till that may cause contaminant migration in a direction other than that of the regional groundwater gradient.

3.2.3 Self-Potential

A self-potential survey is conducted by mapping the natural, time-invariant electric field at the surface of the earth. The method may also be called

spontaneous potential or spontaneous polarization. It was initially developed for mineral prospecting, but in recent years has found increasing use for geothermal and engineering applications. Groundwater applications of the method have included detection of leaks in dams and reservoir floors; location of faults and of voids and rubble zones that affect groundwater flow; delineation of water flow patterns around landslides, wells, drainage structures, and springs; and studies of regional groundwater flow.

Surface self-potential fields may be created by subsurface gradients of pressure, temperature, or chemical concentration. Therefore, the method may be used to provide information about groundwater flow, to delineate areas of anomalous subsurface temperature, or to investigate groundwater chemistry. As the method is relatively fast and simple to execute in the field, it often is cost-effective for initial investigation of an area prior to more intensive studies with other geophysical techniques.

The requirement for general coverage of the area and the geological interpretations prepared in part by examination of photos were used to define which areas should be surveyed. A total of 58,225 feet of continuous survey lines were located throughout the American Lake Garden Tract and the south and west portions of McChord AFB, and are identified on Plate 1. Self-potential measurements were made every 25 feet along the lines and involved inserting an electrode at the base station and then connecting this base electrode to a volt meter. A roving electrode was also connected to the volt meter and the potential difference between the fixed and roving electrodes was recorded. The recording system used consisted of a 10 mega-ohm voltmeter, 3 copper-copper sulfate porous pots (electrodes), an electrode reference system, and 2,000 feet of 18 gauge wire. Repeated observations were made to compensate for electrode drift. Contact resistance and electrode polarization were also monitored.

Variations in the self-potential field were present due to the degree of cultural development in the study area. Some variances were due to electrical potential differences associated with flowing groundwater. Other potential differences could be due to different ionic contents in subsurface fluids, as well as the oxidation/reduction of buried materials such as chemical wastes or

metal. Signal noise was present during the surveys from long period telluric currents in the earth, electrical noise from power lines, and the golf course irrigation water well pumps drawing down a cone and then seeing groundwater recharge.

The data were reduced by removing electrode drift, then entered into a computer contouring program. This computed output was then used to fit a surface through the data while visually smoothing through the large noise anomalies such as power lines and pumping wells. The contour map was then interpreted in view of the other data sets to delineate apparent channels and anomalous features which may be related to disturbed areas.

3.2.4 Seismic Refraction

A seismic refraction study was run over the western portion of McChord AFB and the American Lake Garden Tract to provide additional data regarding geological units and groundwater elevations. Seismic refraction is based on the principle of increasing velocity with depth. Consequently, if there should be a unit in the geological section that has a lower velocity than the overlying unit, then the depths of units below the overlying unit are in error. Also units that are very thin are undetectable. The depth of investigation of seismic refraction is limited to approximately one-third to one-fifth of the total spread length depending on the velocity profile in the study area. For this survey depths of investigation were 1 to 60 feet.

A total of 24,420 linear feet of seismic refraction was performed in this investigation. This lineal footage was accomplished across 90 geophone spreads. The location of these spreads are shown on Plate 1 and generally follow the self-potential survey lines. The seismic refraction survey included 85 profiles 275 feet in length with geophone spacings of 25 feet. In addition, four spreads 220 feet in length were shot with 20-foot spacings and one spread of 165 feet in length was shot with 15-foot geophone spacings. The spreads were "shot" at both ends and in the middle to provide as much depth control as possible. In addition, a total of 16 spreads were "shot" with 5-foot spacings for the purpose of defining the shallow velocity structure. The spreads were not "shot" as continuous lines, but as individual spreads or as a series of spreads across geological features that were suspected to be of

importance in the interpretation of the site geology based upon self-potential and from air photo interpretation.

The recording system used was a 12-channel Oyo seismograph consisting of a Model 1197A signal enhancement unit and a Model 1216A display unit. The energy source was a sledge hammer impacting a steel plate. The data were recorded into memory and displayed on a cathode ray tube. After an appropriate stack was achieved, the data were output onto a graphic printer.

Data reduction began with the hand picking of the first arrivals on each geophone and the plotting of each of these data sets on graph paper to check for reasonableness of the data picks. Some preliminary depth calculations and interpretations were made on these records to establish targets that might be defineable for each spread. The data points for each spread were then entered into a proprietary forward modeling program to compare the proposed geological model response to the calculated response. The geological model was then changed as necessary to obtain consistency with the known geology from boreholes. The depth calculations were made based both on the use of end points in the modeling program and on the method of differences to define more depth points along a spread after velocities had been defined by the modeling program. These data were then plotted on maps with the borehole data and the resistivity sounding data to identify the existence of the Vashon Till and the water table. In parts of the area, it was also possible to interpret geological features below the water table and to map these features over a limited area.

3.2.5 Electrical Resistivity

Direct current resistivity soundings were made at various locations around the American Lake Garden Tract and McChord AFB. Resistivity soundings attempt to measure the earth resistivity as a function of depth. Resistivity is a physical property of the soil matrix and the soil fluid content. The major factor controlling resistivity in a sedimentary environment is the porosity of the soil and the fluid content. This is commonly expressed by a functional relationship called Archie's Law. This relationship is:

$$\rho = \rho_w \Theta^{-2} S_2^{-2}$$

where ρ is the resistivity of the soil when it is saturated with water of resistivity ρ_w, and where Θ is the porosity of the soil and S_w the water saturation.

A total of 40 resistivity soundings were run using the field technique that is commonly called a Schlumberger sounding. The location of these soundings, identified as Soundings A through AN, are plotted on Plate 1. The Schlumberger soundings performed for this study utilized a Bison Instruments Model 2350B resistivity system. The technique utilizes four electrodes with the electrodes symmetrically spaced about a center point. One set of electrodes is a short distance from the center point. These are the potential measuring electrodes and are generally held fixed or moved once during a sounding. The outer electrodes are the current electrodes. As they are extended from the center point, electrical current theoretically penetrates deeper into the ground. Field instruments then record the ratio of the voltage difference between the potential electrodes and the current entered into the ground.

The data were reduced by multiplying the observed data by a geometric factor which itself is a function of the spacings of the current and potential electrodes. The data were then entered into an inversion program (SARI87) which has been developed by students and faculty of the Colorado School of Mines. This program operates iteratively on a model that is entered by the interpreter. The interpreter can continue to interact with this program as necessary to reduce the error between the data and the model. This interpretation is a one-dimensional resistivity versus depth model. Consequently any lateral effects, such as when the actual field conditions deviated from a layered case, would cause perturbations in the interpretation which are unresolvable. Finally, electrical resistivity data were integrated with the self-potential, borehole, and refraction data to produce a contour map of the water table and to delineate other geological features of interest.

3.3 DRILLING, SOIL SAMPLING, AND WELL INSTALLATION

3.3.1 Well Location

The borehole drilling component of the IRP Phase II (Stage 1) Confirmation/ Quantification Investigation at the American Lake Garden Tract included the

installation of 26 two-inch peizometers. The location of the new boreholes can be subdivided into three areas: 12 are located in the American Lake Garden Tract, four near the northern edge of Fort Lewis, and nine on McChord AFB. Their placement was predicated on those preliminary photo interpretations and self-potential survey data which indicate possible anomalies in groundwater flow or water quality characteristics, or the potential for movement through paleoglacial channels of permeable sands and gravels. Plate 1 shows the location of the newly constructed boreholes along with previously constructed boreholes that were used for water level or water quality monitoring.

The borings made during the American Lake Garden Tract Stage 1 investigations included Wells AZ07-AZ09, DZ08-DZ14, LZ01-LZ04, and TZ01-TZ12. The first letter in SAIC's alpha-numeric well numbering system defines the IRP area of concern. For example, the letter "T" indicates the borehole is located in the American Lake Garden Tract. The letter "L" is used for the Fort Lewis Logistics Center, and Letters "A" or "D" are used for previously defined areas on McChord AFB. The second letter in the well I.D. code identifies the type of well installed. During this investigation, all of the monitoring wells were constructed as single-cased peizometers. Thus, they are all Type Z boreholes. The last two numbers merely indicate the order in which the wells were drilled.

3.3.2 Borehole Drilling and Well Construction

The drilling and completion of two-inch peizometers constructed during the American Lake Garden Tract Stage 1 investigations took place between 10 June 1985 and 15 July 1985. The drilling protocol called for determining the depth to the Esperance sand unit and screening the well either near the interface of the sand and overlying geologic formation or at a zone of suspected chemical contamination as measured by a portable organic vapor analyzer. For this series of boreholes, the deepest was drilled to a depth of 73 feet.

The drilling, sampling, and construction of Stage 1 monitoring boreholes were performed using a truck-mounted, Mobile B-61 drill rig that was provided and operated by Kring Drilling, Inc. of Milton, Washington. A four-inch inside-diameter hollow stem auger was used to drill nine-inch diameter holes. All drilling activities and techniques were observed by an experienced SAIC staff

geologist who maintained a geologic log of the lithostratigraphic horizons encountered during drilling. Geologic sampling activites are described in Section 3.3.3.

Schedule 40 polyvinyl chloride (PVC) well casings were installed in the boreholes. Ten-foot lengths of two-inch PVC pipe with threaded flush mounted joints were used to construct the casing. Threaded pipes were used to avoid the necessity of PVC solvents and plasticizers adhesives. A PVC end plug was used to cap the bottom of the well screen. The well screens, 0.010-inch slotted PVC, were installed in 10- to 20-foot lengths. Table 1 is a summary of well casing elevation, diameter, depth and screen zone, and the date of drilling and borehole depth. Wells AZ09, DZ09, and DZ10 were screened at two different depths which were internally referred to as the "A" (shallow) and "B" (deep) screen zones.

The well screens installed during Stage 1 investigations were sand-packed with No. 16 mesh sand. Bentonite and grout seals were constructed above the sand pack. A steel locking protective well cover was grouted in place above the protruding PVC well casing. Figure 8 is an illustration of the typical well construction techniques employed. Finally, in a supporting role, G.N. Wessel & Associates, Tacoma, Washington, surveyed all well monuments to USGS bench marks. Control elevations are reported accurate to 0.01 feet. Survey data were accepted when closure variance was found to be less than 0.1 feet.

3.3.3 Geologic Sampling and Logs

Soil samples were collected for geologic characterization using either a two-inch split-spoon sampler or a 2-1/2-inch split spoon sampler. Samples were collected at five-foot depth intervals through the hollow stem auger. The field geologist visually examined the samples and recorded the information in a geologic log for each borehole. A standard penetration test was performed at the time of sampling. This test consists of driving a standard split-spoon sampler into the soil a distance of 18 inches using a 140-pound hammer which is dropped 30-inches. The number of blows required to drive the sampler the last 12 inches is the Standard Penetration Resistance, or N-value. The N-values provide a relative measure of the compaction of granular soils, such as sand, and the degree of softness or stiffness of cohesive soils, such as clayey silt.

Table 1

CONSTRUCTION DETAILS OF BOREHOLES AND MONITORING WELLS

Well I.D.	Casing Elev.	Casing Diam.	Date Installed	Bore Depth	Well Depth	Screen Depth
AZ07	283.96	2	05/10/85	68	68	48-68
AZ08	281.24	2	05/14/85	43	43	33-43
AZ09(A)	282.12	2	05/15/85	63	63	23-33
AZ09(B)	282.12	2	05/15/85	63	63	53-63
DZ08	273.91	2	05/08/85	32	32	12-32
DZ09(A)	276.94	2	05/09/85	63	58	8-18
DZ09(B)	276.94	2	05/09/85	63	58	48-58
DZ10(A)	269.65	2	05/13/85	68	68	8-18
DZ10(B)	269.65	2	05/13/85	68	68	58-68
DZ11	280.32	2	05/16/85	43	43	23-43
DZ12	279.47	2	05/17/85	78	78	68-78
DZ13	279.46	2	05/20/85	28	28	18-28
DZ14	283.99	2	06/17/85	68	68	58-68
LZ01	272.21	2	06/26/85	48	48	38-48
LZ02	271.12	2	06/27/85	28	28	18-28
LZ03	279.06	2	06/28/85	63	49	29-49
LZ04	279.98	2	07/01/85	63	63	53-63
TZ01	276.45	2	06/10/85	73	73	58-73
TZ02	268.29	2	06/11/85	68	62	52-62
TZ03	276.97	2	06/12/85	63	63	53-63
TZ04	277.35	2	06/13/85	33	33	23-33
TZ05	268.20	2	06/13/85	43	43	33-43
TZ06	272.04	2	06/14/85	68	68	53-68
TZ07	262.05	2	06/18/85	48	48	38-48
TZ08	281.76	2	07/02/85	43	43	33-43
TZ09	258.80	2	07/02/85	43	43	33-43
TZ10	256.02	2	07/03/85	53	53	43-53
TZ11	272.78	2	07/14/85	44	38	28-38
TZ12	272.78	2	07/14/85	58	58	48-58

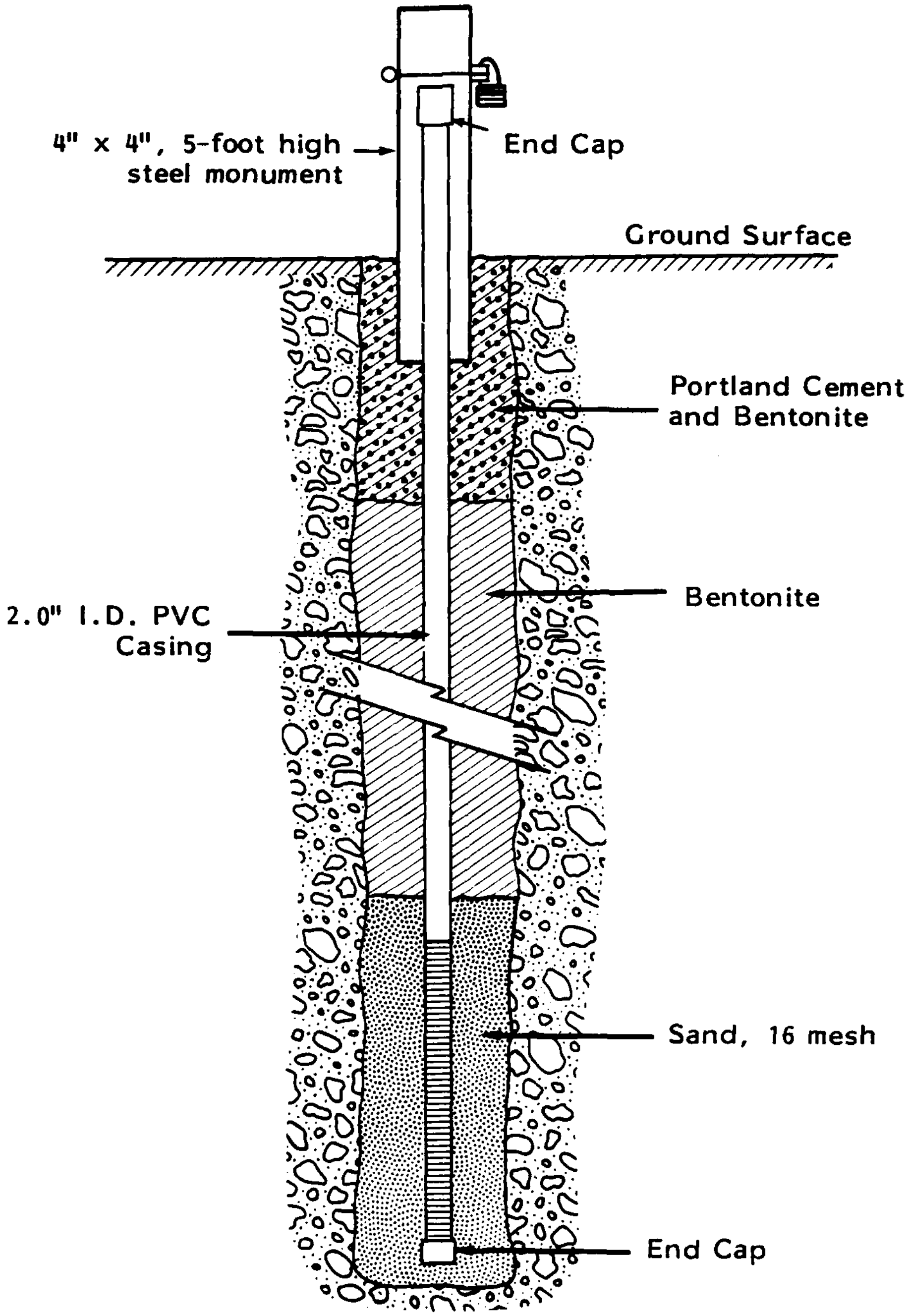

Figure 8

TYPICAL BOREHOLE CONSTRUCTION

A qualitative analysis of each retrieved soil sample was conducted for volatile organic carbon using a Foxboro Analytical Model OVA-128GG organic vapor analyzer. Samples which indicated the potential for volatile organic contamination were noted on the geologic logs. At the completion of sampling, each split-spoon sampler was thoroughly cleaned in a mild laboratory soap solution (Alconox™), rinsed with reagent grade methanol, and allowed to dry before reuse.

Logs for borings and wells constructed during the IRP Phase II (Stage 1) Confirmation/Quantification Investigation at the American Lake Garden Tract are presented in Appendix D. Each log shows the various types of materials that were encountered during drilling and the depths and elevations where the materials and/or the characteristics of the materials changed. The number and types of the samples that were taken during the drilling are indicated in the column to the right of the geologic description. In the next column, the depths of well screens and blank well casings are shown graphically. Also shown in this column is the measured groundwater level and the date on which the measurement was made. Farther to the right are plotted the standard penetration resistance or N-values that were recorded during the split-spoon sampling. Appendix D also contains a listing of the various descriptors and symbols used to classify soil types and soil consistencies as reported on the boring logs. The graphic log for each boring was prepared using standard geologic symbols for unconsolidated materials.

3.3.4 Well Development

Well development, the final step in completing a well, is a technique whereby silts and other fine-grained sediments are removed from the aquifer in the vicinity of the well screen. This removal of the fine sediments restores the permeability of the adjacent geologic formation so that water can enter the well more freely. Well development techniques used on the wells at the American Lake Garden Tract included a jet pump, an air-lift pump, and hand bailing.

The jet pump is usually used as a water well production aparatus rather than a development tool. SAIC preferred to use a single pipe jet pump as a well development tool because water and fine sediments are drawn from the formation

and out of the well, as opposed to the surging action associated with an air-lift pump or the turbulence associated with hand bailing. The jet pump technique, however, proved to be effective in clearing only those wells that were screened in soils with high water yield.

Compressed air was used for well development on more than half of the two-inch diameter wells. One-half inch I.D. Schedule 80 PVC pipe was combined in 10-foot lengths and inserted in the two-inch I.D. well casing. Compressed air was supplied to the 1/2-inch PVC pipe at a maximum pressure of approximately 120 psi. Air-lifting of groundwater and fine-grained sediments was conducted at each well for over one hour during which time an estimated 300 gallons of water (20 to 30 casing volumes, depending on well depth) had been pumped. Well development was considered complete when suspended particulates were noticeably absent and specific conductance did not change by more than 5 umhos/cm.

Finally, hand bailing was used as a standby well development technique in the monitoring wells in which the jet pump was not effective or in wells where the height of the standing water in the well casing was insufficient to effect good air-lift operation. As the simplest yet most tedious of development and flushing methods, hand bailing consists of repeatedly lowering, filling, raising, and dumping a small diameter well bailer. This bailer is constructed of Teflon® components with a stainless steel wire bail. It is 29 inches long with an outside diameter of 1.75 inches. The volume of this bailer is approximately 0.8 liters. Unlike the point-source bailer which has both an upper and a lower ball check valve, this bailer only has a lower check valve. The bailer was lowered into the well on a nylon line. The used line was discarded and the bailer washed in a laboratory detergent (Alconox™) and rinsed with water and methanol after each well was bailed to avoid cross-contamination of wells.

3.4 POTENTIOMETRIC SURFACE MONITORING

Static water level measurements were taken in all wells prior to collection of any water samples. In addition, a comprehensive regional survey of water levels was conducted for the IRP Phase II (Stage 1) investigation at the American Lake Garden Tract. Water levels were monitored in a total of 76 monitoring wells between July 24 and July 29, 1985. These monitoring wells

included 29 located in the American Lake Garden Tract (17 of which installed by the U.S. EPA), 24 at McChord AFB, and 35 located on the north side of Fort Lewis.

Depth-to-water measurements were made using a Powers Well Sounder, an electric sounder. Measurements were recorded to the nearest 0.01 feet. Elevations of the potentiometric surface were calculated using the difference between the depth-to-water values and the measuring-point elevations. Appendix E summarizes the depth-to-water measurements and water surface elevations.

3.5 SOIL GAS SAMPLING IN THE VADOSE ZONE

3.5.1 Introduction to Soil Gas Monitoring

Volatile organics have been measured in soil gases at depths from 2 to 10 feet in areas overlying contaminated groundwater to depths of 30 to 100 feet (Albertsen and Mathess, 1978; Brooks and Corey, 1964; and Glauccum, et al., 1983). Soil gas measurements have been utilized effectively to establish the two dimensional extent of groundwater contamination and to map concentration contours (Marrin and Thompson, 1984). Such methods provide investigators with quick and relatively inexpensive means of determining plume dispersion to help evaluate potential aquifer restoration technologies.

Based upon extensive water quality monitoring in the McChord AFB Phase II (Stage 2) studies, contaminated water supplies of adjacent properties, and the 1957 aerial photos showing land scaring and waste disposal, the Base Housing Gate area is a suspected waste disposal site. Farr, Friedman & Bruya Inc., under contract to Science Applications International Corporation (SAIC), designed a soil gas sampling methodology which was used to analyze gas samples from a 50-borehole grid at the McChord AFB Base Housing Gate.

3.5.2 Theory of Soil Gas Equilibrium

Gas-liquid partitioning and gaseous diffusion are the two dominant mechanisms of transport that allow the presence of volatile organics from contaminated groundwater to be measured in the unsaturated or vadose zone. Gas-liquid partitioning in the vadose zone provides volatile contaminants such as TCE upward transport which may be several orders of magnitude greater than those under conditions of full saturation.

Gas-liquid partitioning between the contaminated groundwater zone and the gas-filled void space of the vadose zone is a relationship of equilibrium defined by Henry's Law. This equilibrium is dependent on several factors such as sudden changes of contaminant concentration (including biodegradation and contaminant adsorption), temperature, and pressure.

Partition coefficients (Hw) for TCE and 1,2-trans-dichloroethylene have been reported to be 0.32 and 0.22, respectively, at 25°C (Farr and Gorelick, 1983). Hw is the ratio of the concentration in air to the concentration in water. The larger the value of Hw, the greater the volatility of the chemical and its affinity to leave the liquid and enter the gaseous phase. Measuring the concentration of an organic contaminant in the soil gas, Henry's constant can be used as an indicator of a contaminant's likely concentration in the aqueous phase and hence the groundwater surface. Because TCE has a high Henry's constant and because the on-site instrumentation had a low detection limit (approximately 0.05 ug/l), the application of soil gas monitoring to determine the presence of groundwater contamination has a high certainty of success.

The second mechanism of volatile organics transport, contaminant flux due to gaseous diffusion, is described by Ficks' First law applied to a gas-filled pore space:

(1) $$Qg = Dg \times \frac{dCa}{dZ}$$

and

(2) $$Dg = Oa \times T \times (D_{ab}),$$

where

Qg = Gas concentration flux in vertical direction (mass per time per distance)

Dg = Gaseous diffusion coefficient (mass er time)

$\frac{dCa}{dZ}$ = Gas concentration gradient in vertical direction (mass per distance)

Oa = the air-filled pore space (dimensionless)

T = relative tortuosity (dimensionless)

D_{ab} = diffusion coefficient of Gas a into Gas b (mass per time)

Note in Equation 2 that as Oa becomes larger, so does Qg. Gas phase diffusion coefficients are on the order of 10^4 to 10^6 larger than liquid phase diffusion coefficients (Slattery and Bird, 1958).

3.5.3 Field and Analytical Methodologies

A soil gas survey was performed on the ground surface in the vicinity of the McChord AFB Base Housing Gate. An array of 50 soil gas probes constructed along five transects was designed over what is believed to be a small dump site used during the 1957-1961 construction of Lincoln Boulevard and much of the base housing area. Figure 9 shows the soil gas probe array which flanks the private property of a residence with groundwater supplies confirmed to be contaminated with trichloroethylene and 1,2-trans-dichloroethylene as measured in Wells W-1 and W-2. The soil gas probe array is also placed among Air Force Wells DR01, DZ06, and DZ07, previously confirmed to be contaminated with the same compounds, and Wells DZ12 and DZ13 constructed under this field investigation.

Previous investigators have used soil gas probes which are driven into the soil or substrate and then removed before proceeding to the next station. The gravelly soils in the area prevent driving any probes into the soil greater than a few inches. Thus the soil gas probes were custom designed and drilled into the soils at the Base Housing Gate. Figure 10 shows the design of the soil gas probe construction and sampling apparatus. The 1/2-inch steel probes were each 10 feet long with a 2-foot perforated extension on the end. Each probe was placed down a 3-3/8-inch hollow stem auger 10 feet. Borehole soils collapsed in upon the gas sampling pipe as the auger was removed. Residual drill cuttings were replaced and compacted with a maul. Finally, the surface of the borehole was sealed with a 2-inch thick puddle of cement. This cement seal was poured to prevent atmospheric air from migrating down the sides of the steel probe and eventually being drawn by vacuum into the gas sampling container. Clean atmospheric air drawn into the sample bottle will cause a dilution effect that could be so great as to cause any gaseous contaminants to be diluted to concentrations less than the detection limit of the analytical methodology.

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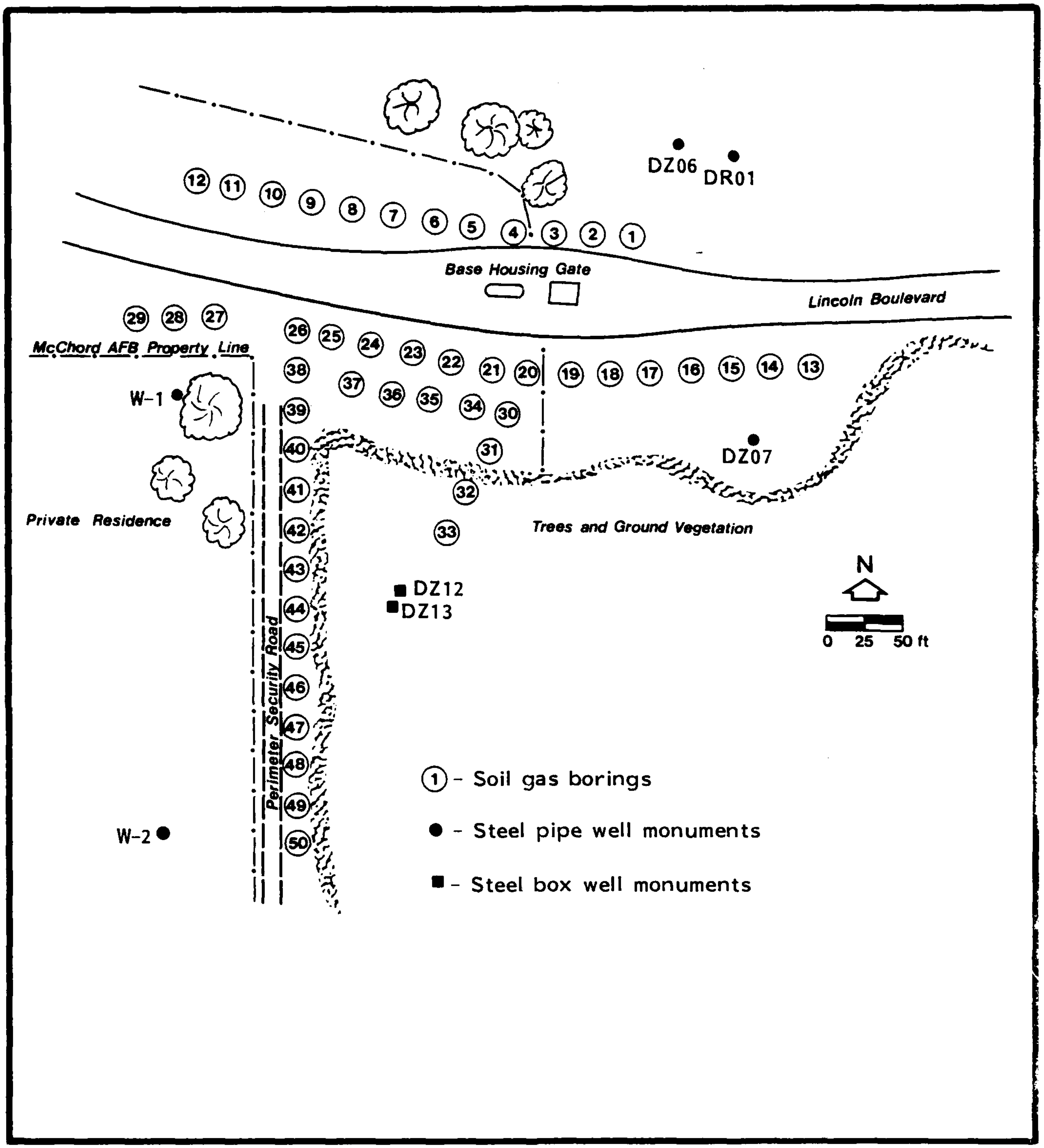

Figure 9

SOIL GAS BOREHOLE LOCATION AT BASE HOUSING GATE
SUSPECTED WASTE DISPOSAL SITE

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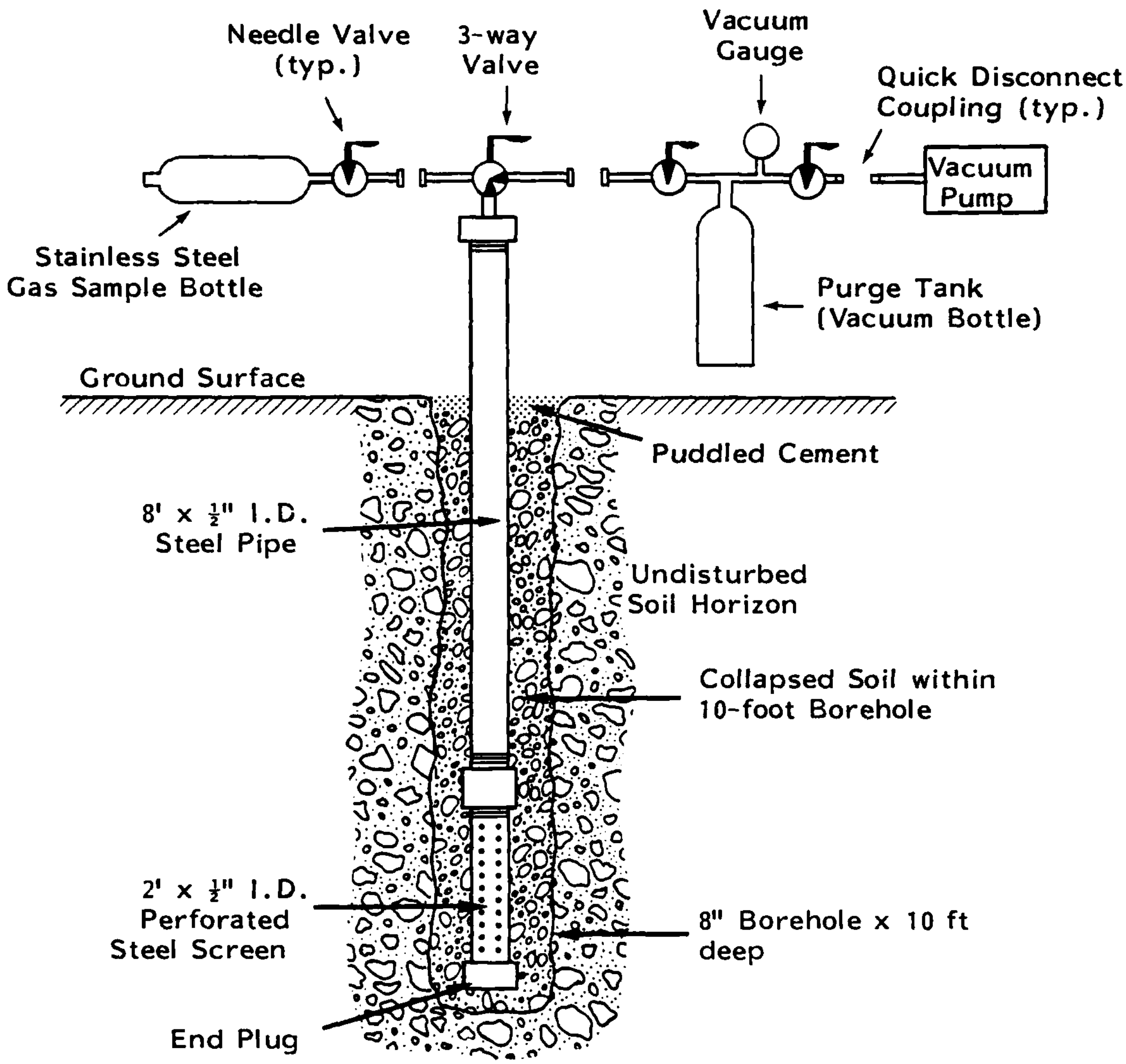

Figure 10

SOIL GAS PROBE AND SAMPLE COLLECTION EQUIPMENT

The soil gas sampling sequence started by evacuating both the stainless steel sampling bottles and the soil gas probe purge tank and placing them on the soil gas probe as shown previously in Figure 10. A volume of 3.5 liters or 3 probe volumes was pulled out of the probe and into the purge tank. After this was accomplished, the purge tank valve was closed. The sampling assembly three-way valve was repositioned, the sampling bottle valve opened, and soil gases would be drawn by vacuum into the stainless steel sample bottle. The sample bottle was then disconnected and carried into a portable field laboratory and a sample injected with a Hamilton gas-tight syringe directly into an AID Model 201 gas chromatograph equipped with an electron capture detector (GC/ECD). A Linear Model 56 strip chart recorder was used to print the chromatographs. The electron capture detector was used in lieu of a flame ionization detector because of its high sensitivity to halogenated hydrocarbon compounds. Gas standards, blanks, and sample replicates were tested throughout the field effort.

The gas sample bottles were cleaned with methylene chloride and methanol after each use. Once rinsed with solvents, the sample bottles were placed under a heat lamp to volatilize all cleaning agents. A small vacuum pump was then used to evacuate each bottle prior to reuse. To ensure no cross contamination between soil gas probes, a blank of the sample bottle air was injected into the gas chromatograph before each reuse.

Quantitation was accomplished by the external standard method for gas analysis because the chromatogram is relatively free of interferences. A 1-ug/l standard of TCE was injected into the GC/ECD unit and the peak height, measured in millimeters, was used to quantitate the positive identifications in the sample runs. Replicates were run on each sample container to ensure that good sample injections were made. Duplicate samples were drawn from eight probes and run to determine sampling precision. As a final test of the field sampling and analytical protocol, a serial sampling of soil gas Probe No. 24 was accomplished in which was evacuated 2, 5, 13, and 25 probe column volumes prior to sampling and analysis to determine if there were any fluctuations or trends in contaminant concentrations over time or volumes of extracted soil gases.

3.6 HYDROCHEMICAL SAMPLE COLLECTION AND ANALYSIS

3.6.1 Sample Collection

Groundwater samples were collected from monitoring boreholes for chemical analysis. The target monitoring wells were flushed by air-lift pumping, jet pumping, submersible pumping, or hand bailing prior to sampling. A four-inch diameter submersible pump was used to flush all four and six-inch diameter casings. The pump generally produced between 20 and 40 gallons per minute (gpm) and was considered effective for removing silt and other particulate material. The presampling flush was performed to ensure that well stagnation would not bias the analytical results. Initially the volume of water required to be flushed in a particular well was determined by periodically monitoring electrical conductivity during the flushing process. The well was considered suitable for sampling after the conductivity stabilized to within ± 5 umho/cm in replicate analyses. In general, all monitoring wells would achieve that stability within 10 minutes.

The method of sample collection was dependent upon the method used to flush the well. The air lift and jet pump were used primarily for flushing purposes only. Once the flushing process was complete, sampling would occur using a point source Teflon® bailer. The bailer was 36 inches in length with an outside diameter of 1.66 inches. When full, the volume of the bailer is approximately 1.0 liters. A Teflon® ball built into both the top and the base served as upper and lower check valves which ensure the integrity of a water sample from a discrete zone. The bailer was lowered into the borehole to a predetermined depth on a nylon line. The used length of line was discarded after each well was sampled to avoid possible transfer of contaminants to other wells. The bailer was washed with a mild detergent solution (Alconox) and rinsed with methanol prior to sampling another well.

During the IRP Phase II (Stage 1) Investigation, samples were collected for analyses of volatile organic composition. Table 2 presents the sampling schedule as performed by well location (see Plate 1) and week. A total of 255 samples were collected in duplicate pairs (i.e., four bottles) of 40-ml bottles that were sealed with Teflon® septums. The bottles were field checked to ensure no air or gas bubbles were entrained when the bottle was capped.

Table 2

AMERICAN LAKE GARDEN TRACT STAGE 1
GROUNDWATER MONITORING SCHEDULE

Well ID	Screen Zone	Sample Depth	Flushing Technique	Date Well Developed	6/3-7/85	6/10-14-85	6/17-21/85	6/24-28/85	7/1-5/85	7/8-12/85	7/15-19/85	7/22-26/85	8/19-23/85	Number of Samples	QC Samples
USAF Wells (new)															
AZ07	48-68	58	Air	5/23	X	X	X	X		X			X	6	
AZ08	33-43	38	Air	5/22	X	X	X	X		X QC			X	6	1
AZ09(A)	23-33	28	Air	5/22	X	X	X	X		X			XQC	6	1
AZ09(B)	53-63	58	Air	5/22	X	X	X	X		X				5	
DZ08	12-32	22	Jet	5/31	X	X				X	X			4	
DZ09(A)	8-18	13	Air	5/24	X	X	X	X		X				5	
DZ09(B)	48-58	53	Air	5/24	X	X	X	X		X				5	
DZ10(A)	8-18	13	Air	6/3	X	X	X QC	X QC		X				5	2
DZ10(B)	58-68	63	Air	6/3	X	X	X	X		X				5	
DZ11	23-43	33	Bail	6/3	X	X	X	X		X				5	
DZ12	68-78	73	Air	5/23	X	X QC	X	X		X				5	1
DZ13	18-28	25	Jet	6/3	X	X	X	X QC		X				5	1
DZ14	58-68	63	Air	6/19			X QC	X	X	X	X			5	1
TZ01	58-73	65	Air	6/19			X	X	X	X	X			5	
TZ02	52-62	57	Air	6/19			X	X	X	X	X			5	
TZ03	53-63	58	Air	6/19			X QC	X	X	X	X			5	1
TZ04	23-33	28	Bail	6/19			X	X	X QC	X	X			5	1
TZ05	33-43	38	Air	6/19			X	X	X	X	X			5	
TZ06	53-68	60	Air	6/19			X QC	X	X	X	X			5	1
TZ07	38-48	43	Air	6/19			X	X QC	X	X	X			5	1
TZ08	33-43	38	Air	7/8						X	XXXXQC			5	1
TZ09	33-43	38	Air	7/8						XX	XXX			5	
TZ10	43-53	48	Air	7/8						XX	XXXQCQC			5	2
TZ11	28-38	33	Air	7/16							XX	XXX		5	
TZ12	48-58	53	Bail	7/16							XX	XXX		5	
LZ01	38-48	43	Air	7/1					X	X	XXXQC			5	1
LZ02	18-28	23	Air	7/1					X	X QC	XXX			5	1
LZ03	29-49	39	Air	7/1					X	X	XXX			5	
LZ04	53-63	58	Air	7/1					X	X	XXXQC			5	1
USAF Wells (existing)															
DR01	8-58	pump	Sub.	6/3	X			X		X				3	
DR02	8-58	pump	Sub.	6/3	X			X		X QC				3	1
DR05	8-48	pump	Sub.	6/3	X			X		X				3	
DZ03	3-53	13/40	Bail	6/3	X(2)								X(2)	4	
DZ07	0-37	30	Bail	6/3	X								X	2	

(A) and (B) = Designation of discrete screen zones within same well casing.
X = One sample per well.
X(2) = Two samples per well.
QC = One sample duplicate for quality control.
NOTE: Flushing techniques included air-lift, jet pump, hand bailing, and submersible pump.

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Table 2 (cont'd)

Well ID	Screen Zone	Sample Depth	Flushing Technique	Date Well Developed	6/3-7/85	6/10-14-85	6/17-21/85	6/24-28/85	7/1-5/85	7/8-12/85	7/15-19/85	7/22-26/85	8/19-23/85	Number of Samples	QC Samples
EPA Wells (existing)															
W1A	95-105	100	Sub.	5/30			X			X				2	
W1B	73-83	78	Air	5/30		X				X QC				2	1
W1C	35-45	40	Air	5/30		X QC				X				2	1
W2A	33-43	38	Air	5/30		X				X				2	
W2B	14-24	19	Air	6/10		X				X				2	
W3A	41-46	43	Sub.	5/30		X				X				2	
W3B	12-17	15	Bail	6/18			X			X				2	
W4A	115-120	117	Sub.	5/30		X QC				X QC				2	2
W4B	69-79	74	Air	5/30		X				X				2	
W4C	30-40	35	Air	5/30		X				X				2	
W5A	40-45	43	Sub.	5/30		X				X				2	
W6A	47-57	52	Sub.	5/29		X QC				X				2	1
W6B	35-40	38	Air	5/29		X				X				2	
W7A	55-65	60	Sub.	5/29		X				X				2	
W7B	27-37	32	Air	5/29		X				X				2	
W8A	41-51	46	Sub.	5/29		X				X				2	
W8B	29-34	32	Air	5/29		X				X				2	
USA Wells (existing)															
LC1	20-60	20/50	Sub.	6/17			X(2)				X(2)			4	
LC2	20-60	50	Sub.	6/17			X				X			2	
LC3	20-60	50	Sub.	6/17			X				X			2	
LC4	20-60	20/50	Sub.	6/17			X(2)				X(2)			4	
LC5	20-60	30/50	Sub.	6/17			X				X		X	3	
LC6	20-60	28/50	Sub.	6/17			X(2)				X(2)			4	
LC13	19-59	30/50	Sub.	6/17			X(2)				X(2)			4	
LC16	Unknown	16/50	Air	6/11			X(2)				X(2)			4	
Domestic Water Supply Wells															
6420	---	---	Tap	---	X QC									1	1
6408	---	---	Tap	---	X QC									1	1
6712	---	---	Tap	---	X QC									1	1
15020	---	---	Tap	---	X									1	
6821	---	---	Tap	---	X									1	
6614	---	---	Tap	---	X									1	
6416	---	---	Tap	---	X									1	
6004	---	---	Tap	---	X									1	
6817	---	---	Tap	---	X									1	
6615	---	---	Tap	---	X									1	
TOTAL SAMPLES					28	27	34	22	12	49	48	6	7	233	
TOTAL QC					3	4	4	3	1	5	5	0	1	26	
FIELD BLANKS										2	2	1	0	5	

X = One sample per well.
X(2) = Two samples per well.
QC = One sample duplicate for quality control.
NOTE: Flushing techniques included air-lift, jet pump, hand bailing, and submersible pump.

Once all the samples were collected, the bottles were sealed, labeled, wrapped in bubble-packing material, placed in coolers, and covered with crushed ice. At the end of the day, all samples were removed from the coolers and inventoried against the field log notes; then, a sample chain of custody log was prepared. All samples were packed in shipping coolers, covered with wet ice or a suitable ice substitute, and the coolers were sealed and secured. Breakaway and/or tear resistant tape was used to seal the coolers per chain of custody protocols. All tape seals were signed by the sampling team leader. The samples were then shipped by the field sampling team via air express to Environmental Research Group, Inc. in Ann Arbor, Michigan. Upon arrival at the lab, all samples were inventoried against the chain of custody log and the sample bottles inspected for sample integrity.

3.6.2 Sample Analysis

Groundwater pH, specific conductance, and temperature were all monitored in the field at the time of sampling. Measurement of pH was conducted using a Chemtrix Type 400 pH meter and an Orion Model 91-05 combination pH electrode. The meter and electrode were standardized using reagents of 4.0, 7.0, and 10.0 pH units. Specific conductance was measured using a Chemtrix Type 700 TDS conductivity meter (0 to 20,000 umhos/cm range) and probe. The instrument was calibrated using a 1,990 umho/cm standard. Temperatures were monitored with an Omega Model 450 ATH hand-held digital meter and thermistor thermometer with a design operating range of -25.7°C to 103.2°C and a resolution of 0.1°C.

All groundwater volatile organic chemical analyses were performed by Environmental Research Group, Inc. in Ann Arbor, Michigan, using the analytical protocols specified by U.S. EPA Methods 601 and 602. Table 3 summarizes the compounds identified in the analyses.

3.6.3 Quality Control

Quality control was an integral part of both the field and laboratory investigations at the American Lake Garden Tract. A proper quality control program assures reproducible and accurate results. The quality control program consisted of a chain of custody in sample handling, a field blank, sample duplication, duplicate analyses by a second lab, and second-column confirmation of water samples suspected to contain volatile organic chemicals.

Table 3

COMPOUNDS IDENTIFIED DURING PURGEABLE HALOCARBON EXTRACTION (EPA METHOD 601) AND PURGEABLE AROMATIC EXTRACTION (EPA METHOD 602)

Purgeable Halocarbons

Bromoform
Bromodichloromethane
Bromomethane
Carbon Tetrachloride
Chlorobenzene
Chloromethane
2-Chloroethylvinyl-ether
Chloroform
Chloroethane
Dibromochloromethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
1,2-Trans-dichloroethylene
1,2-Dichloropropane
1,3-Cis-dichloropropene
1,3-Trans-dichloropropane
Methylene Chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

Purgeable Aromatics

Benzene
Chlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Ethyl Benzene
Toluene

SAIC

The chain of custody is a method of documenting the control of the field samples. The field sampling team leader inventoried the samples and completed the chain of custody. Each subsequent custodian change was documented by signature including a notation of the date, time, and general condition of the samples. Upon arrival at the lab, all samples were reinventoried, the chain of custody was signed, and a copy returned to the SAIC Bellevue office for confirmation of receipt. Appendix I contains a description of the chain of custody procedures and examples of completed logs.

Field blanks were established as a measure of technique in sample collection and handling activities. Two 40-ml sample bottles were filled with commercially available distilled water and transported around the site during a day's sampling activities. The blank samples were then treated the same as the groundwater samples. A field blank analysis with measurable volatile organic compounds suggests contamination may have occurred in preparation of the sample bottle or bailer, hand or air contamination of the bottles during the act of sample collection, or as a result of bottle-handling or sample preparation following the collection of the water sample.

Duplicate sets of samples were collected at approximately 10 percent of the sampling sites. Independent sample numbers were assigned to each pair of containers. Both the water sample and its duplicate appeared on the chain of custody log and were independently analyzed. The sites for duplicate sampling were chosen randomly by the SAIC field sampling team leader.

In addition to the preparation of field blanks and the collection of duplicate sets of samples, quality assurance was also assured through use of a second laboratory for independent analysis of the water samples. A complete second set of paired 40-ml samples were collected and sent to the U.S. Air Force, Occupational and Environmental Health Laboratory (OEHL), Brooks AFB, Texas. U.S. Air Force laboratory personnel selected 10 percent of the samples for duplicate analysis at the OEHL facilities. The results of these analyses are then available to compare analytical results with data presented in this report.

Second column confirmation is a method of verification of the analytical results. At the time of sampling, two 40-ml bottles were collected for each sample, duplicate sample, and field blank. One of the 40-ml bottles was analyzed for volatile organic compounds. If this first analysis indicates the presence of volatile organic compounds at concentration which exceed predetermined trigger levels as specified in the Delivery Order (see Appendix C), the second 40-ml bottle was then analyzed. Chemical compounds and concentrations which triggered the second column confirmation were specified as benzene (0.7 ug/l); carbon tetrachloride (4.0 ug/l); 1,2-dichloroethane (0.1 ug/l); methylene chloride (4.0 ug/l); terachloroethylene (4.0 ug/l); trichloroethylene (1.0 ug/l); vinyl chloride (1.0 ug/l); the sum of all dichlorobenzene isomers (>10 ug/l); and any other single organic contaminant present at a concentration greater than 10 ug/l. If no volatile organics were found in the first analysis, or if chemicals which were detected do not exceed the above threshold concentrations, the second analysis was not performed. Thus the second analysis serves as a confirmation and a replicate quantification of first column results. The second column confirmation technique was used by both laboratories.

The interpretation of sample analyses was dependent upon first and second column confirmations treated as a pair. That is to say chemical contamination can only be quantified and reported where it has been confirmed as present in both samples analyzed. Four cases of data interpretations become possible and are used in this report. First, chemical analyses may fail to detect any or all chemical compounds. These chemicals are then reported as not detected and are treated as not present in the water. Their concentration is, therefore, assumed to be zero. Second, chemical compounds detected and quantified in both first and second column confirmations are reported as present and the resultant concentration is the mean of the first and second column quantifications.

The third interpretation is that where a chemical analyte has been detected in the first column separation at a concentration above the detection limit (e.g., 0.12 ug/l) but below its own trigger concentration which requires second column confirmation. The analyte may be of particular interest and one

of several compounds present, none of which exceed their singular trigger concentration. In those instances where analytical results are not confirmed, the data are recorded as "nc." In general, this designation implies that a chemical has been detected at a concentration between its detection limit and its predetermined concentration which triggers second column confirmation. As an example, this range for the compound trichloroethylene is 0.12 to 1.0 ug/l for samples analyzed in this Phase II (Stage 1) investigation.

Finally, the fourth and most difficult interpretation is that of a compound identified and quantified in one of the column separations but not the other. In those instances where an analyte was detected at concentrations exceeding the trigger levels for second column confirmation, but failed to be confirmed as present (or, conversely, where it was not found in the first analysis but was detected in the second), SAIC elected to report the analyte as "nc," or again "not confirmed" to be present. This designation allows for use of the data in a subjective sense to assist in defining spatial patterns. Because there are no quantified data, however, the interpretations are not absolute. In general, use of the data in this sense is more conservative than disregarding the unconfirmed results. Similarly, however, the absence of confirmed contamination should be viewed with a positive perspective by those potentially affected.

4.0 DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS

4.1 GEOLOGY AND GROUNDWATER HYDROLOGY

4.1.1 Geomorphological Interpretations

The approximate locations of subsurface drainage and depositional channels in the American Lake Garden Tract and McChord AFB study area that are visible by analysis of aerial photography are presented on Plate 2. It is important to recognize that there have been many channels and channel directions through time in the American Lake Garden Tract and that the channels shown on Plate 2 do not necessarily correspond to subsurface channels which may in part determine current groundwater flow directions. The anastomosing channel pattern shown on the plate is related to the complex pattern of channel changes developed through time. This pattern is characteristic of streams with a high sediment load flowing over areas with very low relief. The major channels in the lowland areas are ascribed to be relic drainage channels from historical Lake Puyallup. This interpretation is based on the regional geomorphology and the predominance of Steilacoom gravels in the substrate. Channels on the Porter Hills are ascribed to meltwater streams associated with large blocks of ice. These abandoned channels do not have a drainage basin at their head. Hence it is postulated that the runoff that they once carried came directly from an ice mass. Both types of streams reworked preexisting glacial deposits and may be responsible for eroding large areas of glacial till.

4.1.2 Geophysical Explorations

Reduction of the seismic refraction data (see Appendix G.1) began with the hand picking of the first arrivals on each geophone followed by the plotting of each of these data sets onto graph paper to check for reasonableness of the first arrival picks. Some preliminary depth calculations and interpretations were made on these records. The data points for each spread were then entered into a proprietary forward modeling program to compare the proposed geological model response to the calculated response. The geological model was then adjusted as needed to obtain consistency with the known geology from boreholes and refraction data obtained during earlier remedial investigations on McChord AFB (SAIC, 1985). Table 4 presents a summary of these wave velocities and approximated geologic units.

Table 4

COMPRESSIONAL WAVE VELOCITIES
AS MEASURED AT MCCHORD AFB
AND THE AMERICAN LAKE GARDEN TRACT, WASHINGTON
WITH INFERRED SOIL TYPES AND ASSOCIATED GEOLOGIC UNITS

Layer No.	Velocity Range (ft/msec)	Velocity Average (ft/msec)	Material
1	0.6-1.2	0.9	Unconsolidated, unsaturated surface layer
2	1.7-4.0	2.6	Compacted, unsaturated Vashon Recessional Outwash
3	5.3-8.0	6.9	Compacted, saturated Vashon Recessional Outwash (Water table)
3	6.3-7.7	7.1	Saturated Vashon Advance Outwash (Eserance Sand)
4	8.7-10.5	9.5	Vashon Till
4	9.5-12.0	10.8	Compacted, saturated Vashon Advance Outwash (Esperance Sand)

Depth calculations were made based on both the use of end points in the modeling program and on the method of differences interpretation technique to identify additional depth points along the spread after velocities had been defined by the modeling program. Elevation corrections were then applied to each data point utilizing surveyed surface elevations. Several elevations had to be estimated from topographic maps as some survey stakes were vandalized prior to the McChord AFB survey while others, particularly those in the American Lake Garden Tract, were never surveyed. As a result, accuracy of refraction depths are believed to be within 10 to 20 percent.

Glacial drift complexity also contributes to the limited accuracy of the refraction depths as buried low-velocity zones are common. Also, man-made fills and old infilled erosional channels typically exhibit a nonlinear time-depth relationship which results in a small error when refraction depths are approximated using linear time-depth relationships. Refraction elevations were plotted with the borehole and resistivity sounding data to help define the presence and surface of the water table. Plotting of the refraction data also revealed the Vashon Till surface below the water table over a limited area of the site.

The resisitivity data (Appendix G.2) were reduced by multiplying the observed data by a geometric factor which is a function of the current and potential electrode spacings. The data were then entered into a computer inversion program (SARI87) which was developed by students and faculty of the Colorado School of Mines. This program operates iteratively on a model that is input by the interpreter. The interpreter can continue to interact with this program as necessary to reduce the error between the data and the model. This interpretation is a one dimensional, resistivity versus depth model. These data were then integrated with the self-potential (SP) and refraction data, borehole logs, and water level elevations to produce a contour map of the water table. The resistivity data were also integrated with the refraction and borehole data to map the Vashon Till surface (Figure 11).

Self-potential (SP) data reduction began with the removal of electrode drift, followed by plotting the reduced SP data (see Appendix G.3). The reduced data were then entered into a computer contouring program in order to fit a surface

through the data. Presentation of the SP data in a contoured format provides the best graphic visualization of groundwater flow orientation. This contoured output was then used to hand contour the data while visually smoothing through the large noise anomalies generated by power lines, pumping wells, and other cultural features. SP data are generally not interpreted to give depth information except on a very broad scale, but the major features seen in the SP data appear to be from the upper 25 feet. Plate 3 is a map of the SP data showing contours of iso-potential, and hence the axes of suspected paleochannels, based not only on the SP data but also the other geophysical and geologic data sets. The contour map also delineates anomalous features which may be related to man-made disturbed areas.

There is, in general, a good closeness of fit between the groundwater contours and directions of water flow on Plate 2 as developed from water level soundings and the water movement depicted on Plate 3 as developed from SP measurements and geophysical interpretations. The delineation of subsurface channeling as depicted on Plate 3 was inferred from depressions in the water table as interpreted from the refraction, resistivity and borehole data, and from depressions in the surface SP field.

Major depressions in the surface SP field approximate the boundaries of subsurface channeling interpreted from the aerial photographic analyses. Smaller depressions in the SP field may delineate the boundaries of additional subsurface channeling not detected by photograhic analysis. Most of these inferred channels are supported by the groundwater elevation map derived from the refraction, resistivity, water level sounding, and borehole data.

The major features of the surface SP field were the inferred subsurface channeling and the migration flow vectors. Possible contamination plumes would be those delineated by migration flow vectors passing near suspect sources of contamination and those coinciding with wells known previously to have been contaminated. Major highs in the SP field may help to delineate the boundaries of suspect sources of contamination where positive induced charges are amplified in the more resistive, relatively cleaner subsurface channels or where positive induced charges reside over the inferred contamination source from adsorption of the contaminant complexes. One SP anomaly in the far northeast corner of the study area indicates abnormally high ionic strength. These

SP measurements were taken above what has been reported to be the old base fly ash disposal pit. This area was recommended for placement of a monitoring well (AZ08). Another anomalous feature located at the west end of the ammunition dump may be associated with old ordnance burn pits identified in the IRP Phase I report (CH2M HILL, 1982). Well DZ11 was constructed in this area. A less significant SP anomaly was measured near what is the No. 3 golf course green. The anomaly may reflect affects on groundwater caused by the construction, use, and ultimate demolition of the old golf course club house located 100 to 200 feet to the north of the green.

Other SP anomalies were detected along the eastern flank of old landfills and construction demolition burial pits in the southeast corner of the golf course. One anomaly in particular indicates a positive SP signal between the golf course landfills and the gasoline service station near the Base Commissary. Finally, another SP anomaly at the extreme southeast corner of the American Lake Garden Tract cannot be explained based upon known current or historical land uses. Presently used as a home site and horse pasture, the measured anomaly may be associated with septic drainfield discharges or a previous salt lick used by cattle or horses. Well LZ03 was placed immediately south of this measured anomaly.

4.1.3 Hydrogeologic Interpretations

Previous studies on McChord AFB and within the American Lake Garden Tract have identified two principal water bearing zones in the aquifer above the Lawton Formation. These are the Steilacoom outwash gravels and the Esperance sands. Locally, these are separated by an areally extensive but discontinuous aquitard, the Vashon Till. Monitoring wells installed in previous investigations showed similar piezometric heads at a given location when well screens were constructed in both the Steilacoom gravels and Esperance sands. This was interpreted as being indicative of interconnectivity between the aquifers. Regional groundwater studies, and in particular the IRP Phase II (Stage 2) report, concluded that the groundwater flow direction was to the northwest and that the Vashon Till unit was in some places above the groundwater level.

Drilling and well installation, geophysical surveys, a soil gas survey, and water quality monitoring have been undertaken during the recent investigations to assist in the interpretation of the local groundwater resource.

Location of drilling boreholes was predicated on the assumption that groundwater was seeking eroded channels or depositional fans of coarse materials. Photo interpretation and geophysics (particularly self-potential and seismic refraction data) were used to site the location of monitoring wells in areas thought to be voids in the till surface and possibly representing remnant stream channels and coarse materials.

A total of 26 borings were made during the Stage 1 field program. All were drilled with hollow stem auger which allowed the collection of soil samples every five feet. These soil samples, taken in front of the drill bit, allowed the development of detailed boring logs. These logs, and the record of drilling and well casing, are contained in Appendix D. Boring logs of all wells drilled by others for the U.S. Army in the Logistics Center are also contained in Appendix D. The borehole logs supplement more than 60 other logs developed from wells in previous groundwater studies in the Garden Tract and on the two military installations.

Plate 1 identifies the location of all wells drilled under this Stage 1 study together with the field efforts undertaken in the geophysics studies. Plate 1 also presents geologic cross sections through the study area. Both seismic refraction surveys and borehole drilling indicate that the Vashon Till is absent across the American Lake Garden Tract. Local areas of Vashon Till do occur in the study area however, primarily on the Air Force Base (refer to Figure 11). Westcott and Porter Hills are likely to be noneroded remnants of the Vashon Till unit. Boring logs and geologic cross sections indicate that in the absence of the Vashon Till unit the Steilacoom gravels directly overlie the Esperance sands. Seismic refraction results confirmed this succession, thus allowing this interpretation to be extended into areas not covered by the drilling program. Geologic cross sections indicate thicker deposits of gravel in broad channels along the north and the south-central boundaries of the Garden Tract.

In the absence of the Vashon Till, and thus any overlying protection of lower groundwaters from surface contamination, a protocol was developed for vertical placement of the monitoring well screen zones. Unless drill cuttings or groundwater samples collected during drilling indicated contamination as

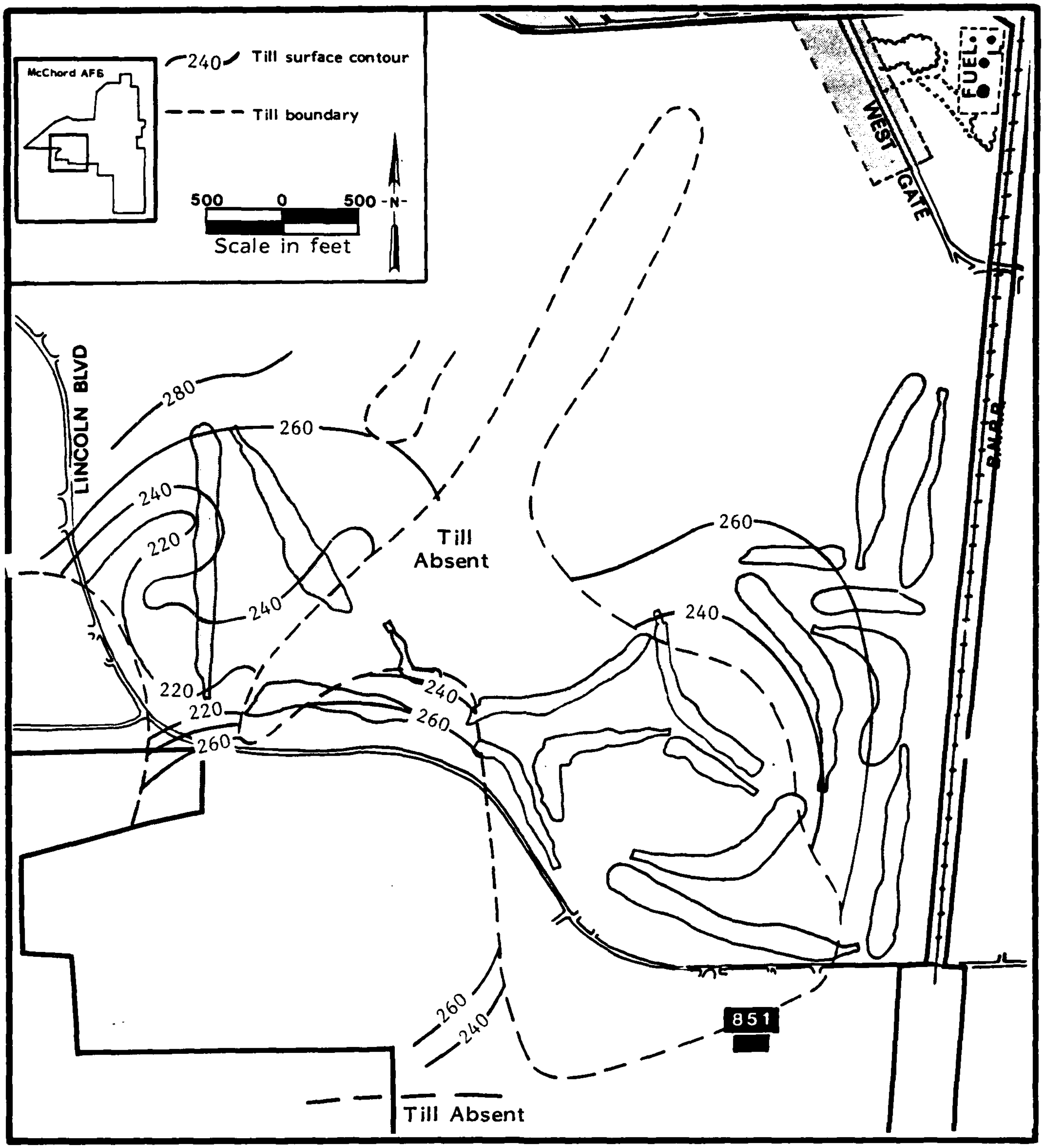

Figure 11

APPROXIMATED PRESENCE AND SURFACE RELIEF
OF VASHON TILL BENEATH THE McCHORD AFB
GOLF COURSE AND ADJACENT AREAS

measured with the organic vapor analyzer, the 10-foot well screen was placed at or immediately below the change in strata from outwash gravels to Esperance sands. In selected instances, notably Wells AZ09, DZ09, and DZ10, two screen zones were constructed in the same well casing to enable water collection at two horizons. The separation between screen zones is at least 20 feet.

Water level measurements in more than 80 monitoring wells throughout the study area, supplemented by interpretation of the seismic refraction and resistivity surveys, have been used to determine groundwater elevations in the study area. Appendix E contains all groundwater elevation data, including depths to groundwater, water table elevations corrected to sea level, mean water table elevations, and the elevations and dates of measured low and measured high water tables.

Water level surface contours as measured during the period July 24-29, 1985, are presented on Plate 2. A comprehensive sounding of wells across McChord AFB, the Garden Tract, and Fort Lewis was made during this time frame. Following almost six weeks without measurable precipitation, this groundwater-sounding exercise measured the water table at perhaps its seasonal low.

Groundwater surface contours indicate a general northwesterly to westerly flow direction across the study area. Local perturbations in the groundwater contours occur which are interpreted as resulting from variation in aquifer hydraulic conductivity. As an example, deposits within a paleochannel may have higher hydraulic conductivity than the adjacent deposits. This will lead to groundwater contours being deflected in an upgradient direction.

The results of the geophysical investigations and monitoring of water levels indicate there are at least three dominant channel-like features, which may relate to paleochannels, that appear to exist in the Garden Tract. These channels are indicated on Figure 12 and are described at the ground surface as follows:

1. Extending from the north of Westcott Hills and beneath Lincoln Boulevard westward across the northern limit of the American Lake Garden Tract. This feature probably leaves the Garden Tract near what once was Emerson Lake and heads northwest towards American Lake.

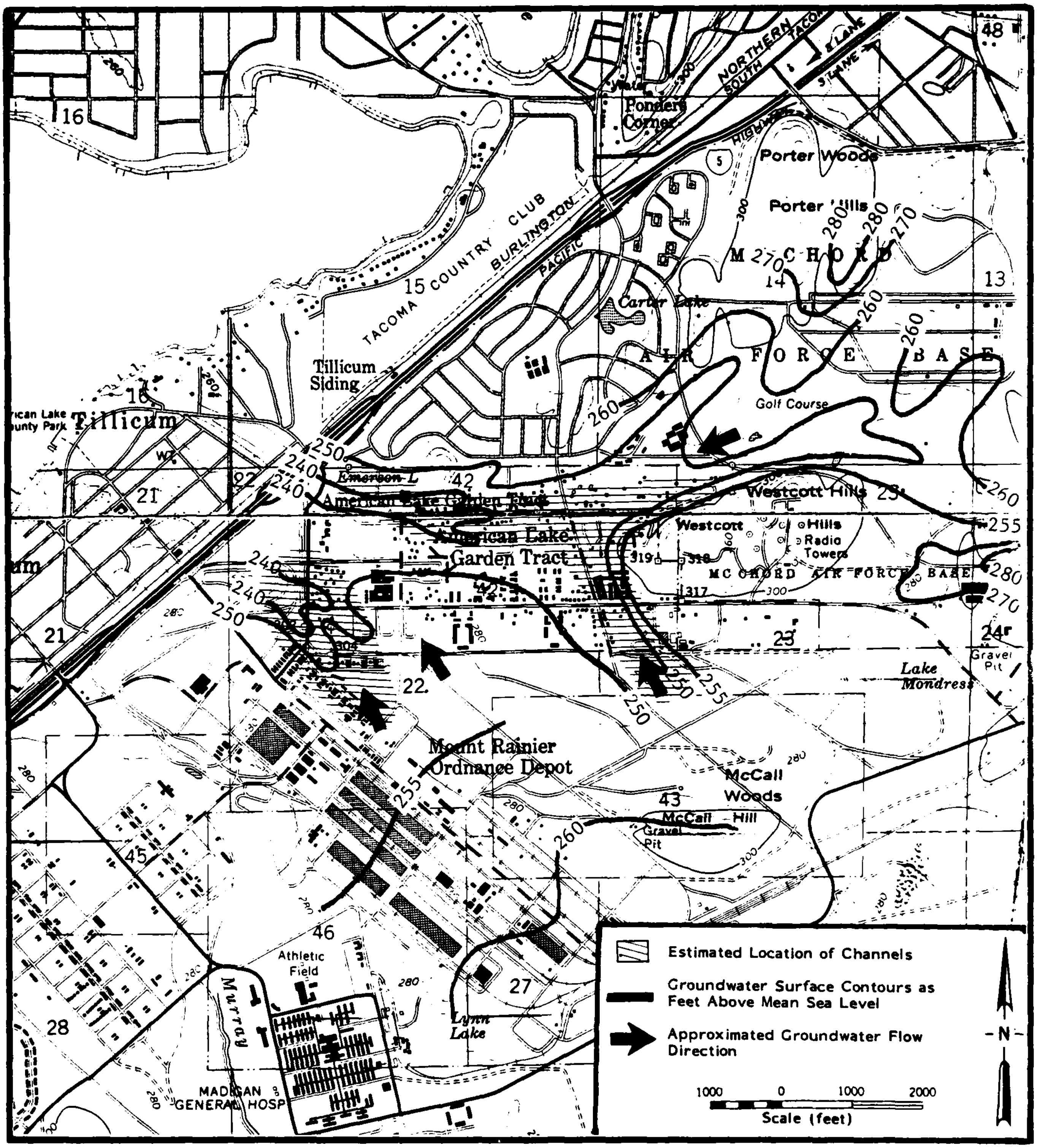

Figure 12

GENERALIZED GROUNDWATER SURFACE CONTOURS AND APPROXIMATE LOCATION AND SHAPE OF CHANNELS INFLUENCING GROUNDWATER FLOW IN OUTWASH DEPOSITS BENEATH THE AMERICAN LAKE GARDEN TRACT
(see Plate 2 for greater detail)

2. A northwest trending channel originating on Fort Lewis, crossing beneath the intersection of Woodbrook Drive and 150th Street S.W., and connecting with the northerly feature slightly east of Spring Street. Seismic data indicates that locally this may be two channels, each running parallel to the other.

3. The broadest of three features may be trending northward across the Fort Lewis Logistics Center from the area near Madigan Hospital, beneath Murray Road, and towards the I-5 interchange at the northwest corner of the Garden Tract. It is likely this feature and the other features identified above join together near the south limits of American Lake.

The shape and direction of groundwater flow within these features will be reflected in water quality. Local water quality along the northern boundary of the Garden Tract will be strongly influenced by groundwater quality and surface activities on McChord AFB in the southern portions of the golf course and other base facilities. Numerous landfills suspected of containing construction rubble, demolition debris, buried ordnance, and some industrial wastes are reported to be located in the southeast corner of the golf course (CH2M HILL, 1982). These landfills are due east and quite probably hydraulically upgradient of the northern most feature.

Groundwater quality in the southeast and central portions of the Garden Tract would be comparable to that on Fort Lewis and reflect surface activities in the McCall Woods area. This area is generally undisturbed and has no known or suspected waste disposal or spill sites. Water quality in the southeast and central portions of the Garden Tract should, therefore, be of good quality and free of contamination reflective of anthropic activities.

Finally, the broad feature trending northward beneath the Fort Lewis Logistics Center may intercept and carry into the western flank of the Garden Tract and beyond any contaminants released from surface activities within the Logistics Center. In addition, the groundwater vector may be so great as to cause the northward migration of contaminants from past or present activities south and east of the Logistics Center. Chemical characterization of samples from all wells would confirm the effect this feature has on local groundwater movement.

4.2 BASE HOUSING GATE SOIL GAS SURVEY

4.2.1 Analytical Results

Table 5 lists the results of the soil gas trichloroethylene (TCE) concentrations as measured in all fifty probes. These results were calculated from peak heights recorded on the strip charts, photocopies of which are included in Appendix F.1. TCE soil gas concentrations range from a high of 1.1 ug/l (Probe No. SG28) to a low of between 0.1 to 0.05 ug/l. The 0.05 ug/l measurement was the estimated lower detection limit for the sample size injected and the attenuation setting on the instrument. Detection limits of perhaps an order of magnitude lower may be attained by using larger sample sizes and more sensitive detector settings.

Figure 13 shows the spatial relationship of the soil gas probes and the measured TCE concentrations as ug/l in both the soil gas phase and in the aqueous phase as measured in nearby monitoring wells. The soil gas data indicate the presence of a gradient in the 12 probes on the north side of Lincoln Boulevard. The TCE concentration at Probe No. SG1 is measured as 0.3 ug/l and increases to 0.9 ug/l at Probe No. SG5. The TCE concentration then decreases to the lower detection limit as the sampling effort moved west to soil gas Probe No. SG12. On the south side of Lincoln Boulevard, the highest soil gas TCE concentrations are measured in Probe Nos. SG24 through SG28, and SG36 through SG39 near the corner of McChord AFB and private property to the west. Soil gases drawn from probes along the base perimeter security road indicate that TCE concentration decreases as one progresses southward until, at Probe No. SG50, the soil gas TCE concentration was again at the lower detection limit. A similar decline in measurable soil gas TCE is found in the linear transect formed by Probes numbered SG30 through SG33. The north and east extent of the contamination has yet to be defined. The distribution of the soil gas TCE indicates, however, that the subsurface dump site adjacent to and south of the guard shack is not the source of measured groundwater contaminants in the Base Housing Gate area. Instead, because the localized groundwater flow gradient is northeast to southwest, the source of contaminants is likely to be east or northeast of the gatehouse.

Table 5

SOIL GAS TRICHLOROETHYLENE CONCENTRATION (as ug/l)
NEAR THE MCCHORD AFB BASE HOUSING GATE

Soil Gas Probe No.[a]	Soil Gas Concentration	Gas Sample (Duplicate)	Soil Gas Probe No.[a]	Soil Gas Concentration	Gas Sample (Duplicate)
1	0.3		26	0.8	0.7
2	0.5		27	1.0	0.8
3	0.4		28	1.1	
4	0.2	0.1	29	0.5	
5	0.9		30	0.1	
6	0.7		31	0.1	
7	0.5		32	@ LDL[b]	
8	0.5		33	@ LDL[b]	
9	0.4		34	0.1	
10	0.3		35	0.3	
11	0.3		36	0.5	
12	@ LDL[b]		37	0.5	0.4
13	0.2		38	0.6	0.5
14	0.5		39	0.8	0.8
15	0.2		40	0.5	
16	@ LDL[b]		41	0.3	
17	0.3		42	0.2	0.1
18	0.3		43	0.2	
19	0.1		44	0.2	
20	0.2		45	0.2	
21	0.2		46	0.2	
22	0.6		47	0.2	
23	0.4		48	0.2	
24	0.7	0.6	49	0.1	
25	0.6	0.5	50	@ LDL[b]	

[a]Soil Gas (SG) probe prefix deleted for clarity.
[b]LDL = lower detection limit.

SAIC

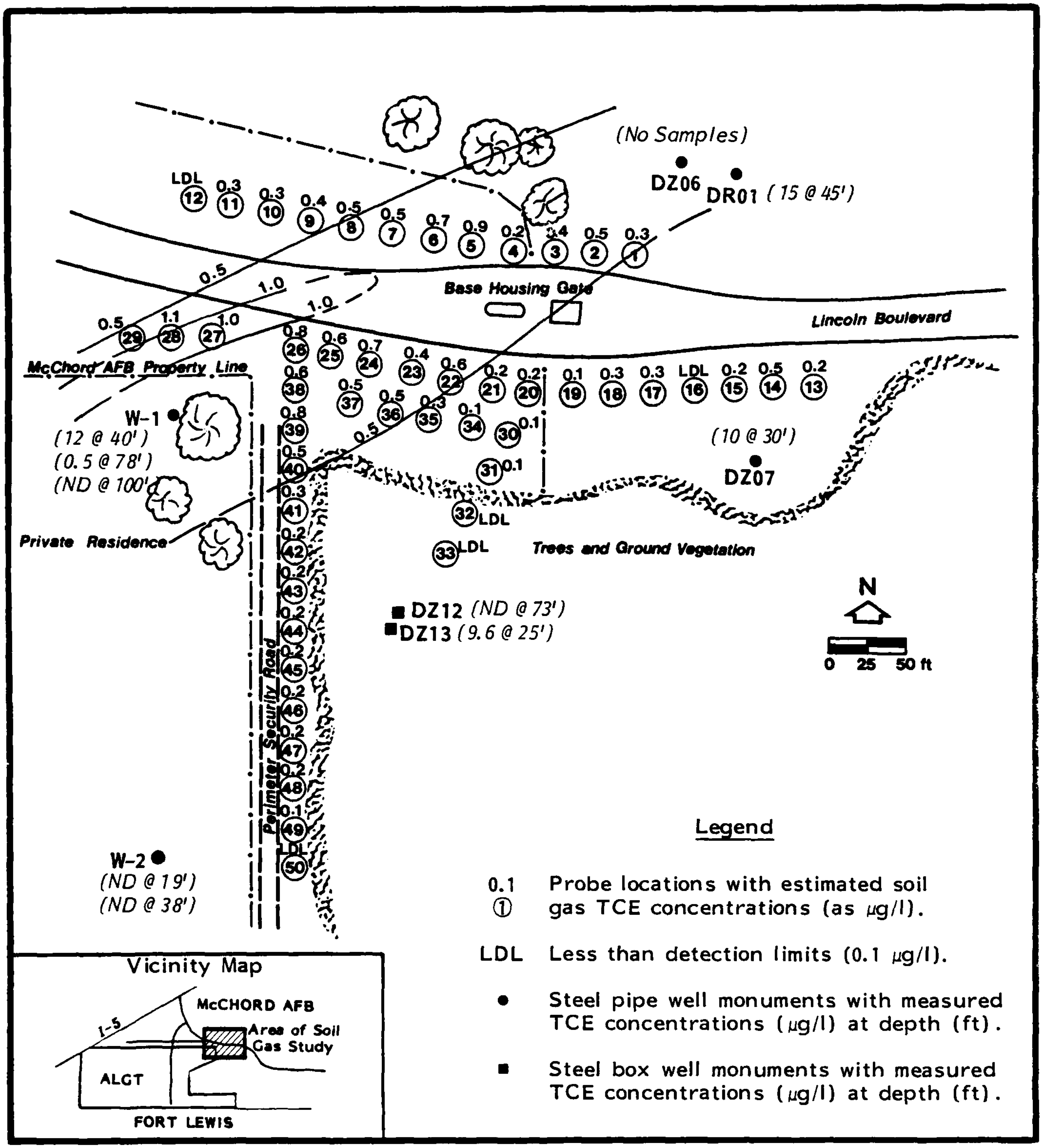

Figure 13

SOIL GAS TRICHLOROETHYLENE CONCENTRATIONS AND GRADIENTS NEAR McCHORD AFB BASE HOUSING GATE AS MEASURED JULY 24-28, 1985

4.2.2 Analytical Quality Control

A syringe blank was run between each sample analysis to make certain that cross-contamination was not occurring. Sample bottle blanks were run between each sampling and decontamination procedure to also ensure no cross-contamination. Gas standards were run both in the morning before sample runs and after sample runs were completed each day. Three replicates of the standards were run and the average peak height was taken as the day's reference standard.

Analytical replicates were run for each soil gas sample. The results of a representative eight samples are listed below:

Soil Gas Probe No.	Sample Peak Height (mm)	Replicate Sample Peak Height (mm)
SG4	3	3
SG25	12	13
SG26	19	21
SG27	23	25
SG37	12	13
SG38	16	17
SG39	25	22
SG42	2	3

Excellent precision was observed in all cases. To determine whether fluctuation in concentration occurred due to adsorption of TCE to the walls of the stainless steel sample bottle, replicates were run prior to and after the sample bottles were placed under the heat lamp. No significant differences were measured. Thereafter, heating sample bottles before injection of samples was discontinued.

Duplicate samples were collected from eight soil gas probes and analyzed to check sampling precision. The results of replicate sampling and analysis are presented below along with the determination of the relative percent differences (RPDs).

Probe No.	Sample (S) Concentration (as ug/1)	Duplicate Sample (D) Concentrations (as ug/1)	RPD*
SG4	0.2	0.1	66%
SG24	0.7	0.6	15%
SG26	0.8	0.7	13%
SG27	1.0	0.8	22%
SG37	0.5	0.4	22%
SG38	0.6	0.5	18%
SG39	0.8	0.8	0%
SG42	0.2	0.1	66%

$$*RPD = \frac{S - D}{(S + D)/2} \times 100$$

As the RPDs indicate, the precision is good for all reported data except the values at lowest concentration levels.

A serial sampling of Probe No. SG24 was accomplished to check whether or not the probes were sealed adequately with the puddled cement, and if soil gas contaminant concentrations varied with purge volumes. Gas samples were collected from the probe after 2, 5, 13, and 25 column volumes had been purged. The results of this test are listed as follows:

Probe No.	Run No.	Gas Volumes Purged	Soil Gas Concentration	Replicate Concentration
SG24	A	2 column volumes	0.6 ug/1	0.6
SG24	B	5 column volumes	0.6 ug/1	0.6
SG24	C	13 column volumes	0.7 ug/1	0.6
SG24	D	25 column volumes	0.7 ug/1	0.7

If the probe were open to the atmosphere, one would expect the concentration to drop after an initial purging volume. Conversely, if three purge volumes were inadequate to represent actual soil gas concentrations, one would expect the gas concentration to rise with increasing purge volumes. Stability in gas concentrations over increasing purge volumes indicate that the puddled cement

on at least Probe No. SG24 provided a tight seal at the ground surface, and that the protocol to purge all gas probes with three probe volumes is adequate to collect a representative gas sample.

4.3 GROUNDWATER CHEMICAL CHARACTERISTICS

4.3.1 Inorganic Hydrochemistry

More than 60 groundwater monitoring wells were sampled on multiple occasions to measure groundwater pH, specific conductance, and temperature. All measured data were entered into an electronic data base and then sorted and summarized by well identification. These groundwater data are presented in Appendix E. The mean and range of measured values within each well tested are calculated and summarized in Table 6.

Groundwater pH in the study area had a tested range of about 5.5 to 8.4 Standard Units. Measured pH values of 6.7 to 7.1 are representative of a mean pH. These slightly acidic pH readings are very normal. There are no apparent anomalies in groundwater pH which would indicate gross contamination or a trend in changing water quality.

Mean values for specific conductance and temperature are plotted on Plate 4. The data indicate that specific conductance in upgradient groundwater is generally less than 150 umhos/cm. A general rise in specific conductance as water moves northwest beneath the Garden Tract is expected due to septic tank drainfield percolation and anthropic activities on the land surface. A 200-umho/cm isoline can be drawn on either side of what previously has been suggested to be a paleochannel flowing east to west and parallel to the northern limits of the American Lake Garden Tract. Elevated specific conductance in Well LC-6 in the Logistics Center and particularly Well DZ09 on McChord AFB indicate probable groundwater contamination.

The shapes of the specific conductance isolines are not unlike the groundwater surface elevation contours. The isolines suggest that groundwater flow is to the northwest over the Logistics Center, and that there may be a channeled plume of groundwater with elevated specific conductance flowing west from McChord AFB into the Garden Tract. It is probable that buried landfills

Table 6

MEAN AND RANGE OF MEASURED VALUES WITHIN EACH WELL
TESTED AT AMERICAN LAKE GARDEN TRACT STUDY AREA

Well ID	pH		Specific Conductivity (umho/cm)			Temperature (°C)		
	High	Low	High	$\bar{X}$	Low	High	$\bar{X}$	Low
AZ07	7.50	6.90	183	172	163	15.7	13.8	11.7
AZ08	7.60	6.11	168	167	165	19.7	15.5	13.2
AZ09A	7.60	6.59	163	152	135	16.8	14.4	12.8
AZ09B	7.60	6.82	175	159	148	13.8	13.0	12.0
DR01	7.00	6.33	177	175	173	12.0	11.6	11.3
DR02	6.50	6.30	193	175	157	12.4	12.1	11.8
DR05	6.80	6.22	177	176	174	11.6	11.1	10.3
DZ03A	5.49	---	---	---	---	13.6	---	---
DZ03B	5.49	---	---	---	---	13.6	---	---
DZ07	---	---	---	---	---	11.9	---	---
DZ08	7.00	5.49	205	182	159	16.0	14.1	12.4
DZ09	7.80	7.39	305	301	295	16.8	14.1	12.8
DZ10A	7.30	6.30	166	153	147	17.8	14.7	13.0
DZ10B	7.20	6.30	159	150	144	16.0	13.8	12.1
DZ11	6.80	6.20	163	145	131	13.0	12.0	10.8
DZ12	8.20	7.23	210	192	170	16.5	13.0	10.9
DZ13	7.21	6.73	172	169	164	15.5	13.2	11.3
DZ14	8.40	7.00	114	110	103	16.7	13.4	11.6
EPA-1A	7.70	7.57	225	218	210	12.1	11.9	11.7
EPA-1B	7.45	7.30	260	240	220	14.5	14.1	13.7
EPA-1C	6.80	---	149	---	---	14.6	14.4	14.2
EPA-2	7.50	7.20	205	185	182	14.6	14.0	13.4
EPA-3A	7.20	---	210	---	---	16.1	15.4	14.7
EPA-3B	7.55	6.50	173	172	172	15.5	15.4	15.2
EPA-4A	7.70	---	178	---	---	14.6	15.5	14.3
EPA-4B	7.70	7.20	220	204	188	14.1	13.7	13.2
EPA-4C	7.75	6.70	175	170	165	13.8	13.4	13.0
EPA-5	7.60	7.10	260	240	220	14.2	13.8	13.4
EPA-6A	7.20	---	210	---	---	14.4	13.3	12.2
EPA-6B	6.80	---	140	---	---	15.1	13.5	11.9
EPA-7A	6.80	---	183	---	---	15.8	15.4	15.0
EPA-7B	6.90	---	187	---	---	16.6	15.2	13.8
EPA-8A	7.10	---	151	---	---	15.2	14.2	13.2
EPA-8B	6.80	---	153	---	---	17.4	16.4	15.4
LC01A	7.30	6.30	124	123	12.1	12.0	---	---
LC01B	7.20	6.75	122	120	118	10.5	---	---
LC02	7.20	6.50	123	119	115	19.7	---	---
LC03	6.75	---	116	---	---	20.8	---	---
LC04A	7.05	7.00	172	149	125	17.6	---	---

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Table 6 (Cont'd)

Well ID	pH High	pH Low	Specific Conductivity (umho/cm) High	Specific Conductivity (umho/cm) $\overline{X}$	Specific Conductivity (umho/cm) Low	Temperature (°C) High	Temperature (°C) $\overline{X}$	Temperature (°C) Low
LC04B	7.30	6.75	156	151	145	12.3	---	---
LC05	7.12	6.85	144	139	134	16.4	---	---
LC06A	7.10	6.65	148	146	143	14.1	---	---
LC06B	7.10	6.75	139	146	133	14.8	---	---
LC13A	7.20	6.50	124	121	118	16.1	---	---
LC13B	7.00	6.75	123	122	121	14.9	---	---
LC16A	7.55	5.22	145	141	138	14.6	---	---
LC16B	7.04	7.55	167	157	147	17.5	---	---
LZ01	8.20	6.99	174	169	161	13.1	12.8	12.4
LZ02	8.93	6.80	196	165	150	18.6	14.5	12.4
LZ03	7.75	6.90	140	136	132	13.7	12.9	12.1
LZ04	8.10	7.00	158	156	155	26.1	19.3	12.5
TZ01	7.46	6.60	250	223	172	14.3	13.2	12.7
TZ02	7.40	6.94	200	191	180	17.3	13.3	11.9
TZ03	7.50	6.93	170	156	137	14.6	12.8	13.3
TZ04	7.40	6.45	173	139	119	13.5	12.3	11.5
TZ05	7.40	7.02	162	154	144	13.6	12.4	11.9
TZ06	7.80	6.99	188	178	158	14.8	12.9	12.0
TZ07	7.71	6.50	235	207	167	14.8	13.5	12.5
TZ08	7.75	6.71	121	117	108	15.2	---	---
TZ09	7.90	6.89	191	182	174	17.0	15.4	13.8
TZ10	7.80	7.20	225	207	200	15.4	13.8	12.1
TZ11	7.53	7.22	200	193	183	---	---	---
TZ12	7.40	7.33	168	155	142	---	---	---

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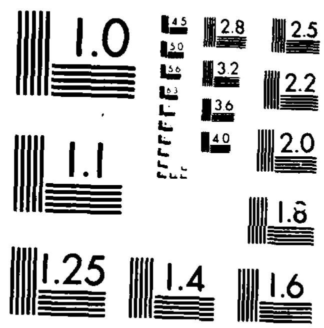
UNCLASSIFIED 20 DEC 85 SAIC-85/1791 F33615-80-D-4002 F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART

beneath the golf course contribute to the elevated specific conductance in Well DZ09 and other wells to the west. While the horizontal distance is much greater in the Logistics Center, Old Landfill No. 2 south of Lincoln Drive (not to be confused with McChord AFB's Lincoln Boulevard) appears to be upgradient and on alignment with the bulge in the conductivity contour to the north and west.

Temperature data are less conclusive than specific conductance and contouring becomes not meaningful. Local groundwater temperatures upgradient of the study area appear to be in the range of 12 to 13 degrees Celcius (C°). While no trend is observed across the Logistics Center or the west end of the Garden Tract, a temperature rise of 2°C to 3°C is indicated as groundwater moves west across the American Lake Garden Tract from McChord AFB. This temperature rise may be a result of channelized and more rapidly moving groundwater fanning out and slowing as it crosses the Garden Tract. Increased residence time will allow the water to warm, as will too the thermal load associated with septic tank drainfield discharges.

4.3.2 Organic Hydrochemistry

A total of 260 water samples and sample replicates were collected from 10 domestic water supply and 56 groundwater monitoring wells. All water samples were analyzed for the priority pollutant volatile organic chemicals (VOCs) using EPA Methods 601 and 602. Appendix F.2 presents the results of a special test to determine the effect of holding time on the stability of trichloroethylene and 1,2-trans-dichloroethylene in groundwater. Appendix F.3 presents analytical and quality control reports for all samples, including sample replicates, field blanks, and intra-laboratory calibration. Finally, Appendix F.4 presents all analytical results from the 260 water samples plus sample duplicates and field blanks. Chromatograms and quantitation reports for all lab work are contained under separate cover and are available from the USAF/OEHL. The reader is cautioned that laboratory results in Appendix F.4 are reported as milligrams per liter (mg/l), while data discussed within the text or presented in summary tables are reported as micrograms per liter (ug/l). This transformation was made to eliminate the number of zeros in the reported data.

The analytical data represent contaminant compounds detected and quantified on separate GC columns. A number of symbols and methods used in treating the data are discussed below. The discussions are presented in sequence of event associated with the sample. More specifically:

1. One of two sample bottles was prepared and analyzed in the laboratory. First column results were then tabulated presenting both the type and measured quantity of chemical contaminant(s). The data were then presented on a summary sheet and coded by sample set, a number unique to the laboratory. The American Lake Garden Tract laboratory project number was A3107 and is divided into 12 sets of samples from bottles derived via 14 sample shipments. First column results were given a single digit number to the right of the decimal and project number (e.g., A3107.1).

2. Any contaminant quantified to be at or above the analytical detection limit was reviewed to determine if its concentration triggered second column confirmation. Second column testing was required if any of the following chemical compounds exceeded the concentrations listed below:

Benzene	0.7 ug/l
Carbon Tetrachloride	4.0 ug/l
1,2-Dichloroethane	0.1 ug/l
Methylene Chloride	4.0 ug/l
Tetrachloroethylene	4.0 ug/l
Trichloroethylene	1.0 ug/l
Vinyl Chloride	1.0 ug/l
Dichlorobenzene isomers	Sum >10 ug/l
Any other organics	>10 ug/l

3. Second column confirmations were performed if necessary. Second column analytical reports became a subset of the first column data and were coded with a three-digit number (e.g., A3107.101).

4. First and second column data were compaired to confirm the presence of a contaminant compound and to establish its estimated concentration (refer to Section 3.6.3).

5. A system to code the data results was developed to ensure that the reader is given as much information as possible. Samples tagged "QC" indicate replicated sampling for quality control purposes, while samples tagged "D" indicate duplicate sampling for comparative analysis. Where a contaminant was not confirmed and quantified in both columns, either an asterisk (*) or the letters "nc" were used to code the significance of the data. The coding system is explained as follows:

   * - The asterisk implies that a chemical compound was analyzed for but not detected at the specified detection limit. Most VOC detection limits were frequently in the 30 to 200 parts per trillion range.

nc - The letters "nc" mean that a chemical compound was detected and quantified but not confirmed because either it was not detected in the second column procedure (or, conversely, detected in the second but not the first analysis), or that no second column test was performed because the trigger concentrations were not exceeded. Thus, for example, a sample with 0.8 ug/l of trichloroethylene would be recorded as "nc" because no second column confirmation would be conducted to prove its presence above the detection limits (0.120 ug/l).

6. Confirmed and quantified analytical results for a given water sample were summed by chemical compound and a sample mean recorded. Similarly, the mean of a sample and its QC replicate was developed and treated as a single reported value when computing the grand mean of all samples taken in a given well.

A summary of all groundwater volatile organic chemical data is contained in Table 7. The sample data are presented by well and sample depth (in feet) as measured from the top of the protective steel monument. The eight chemicals identified across the top of the table are those VOC chemicals which occur with the greatest frequency in the American Lake Garden Tract study area. Any additional chemicals detected during one or both column separations are identified in Table 7 footnotes. In review of the analytical results presented on the following pages, the reader is made aware of the following:

1. Field contamination of the sampling bailer with methylene chloride voided several of the first day (06/03/85) results. This contamination is believed to have interfered with GC analysis of several water samples and may account for the reported presence of 1,2-trans-dichloroethylene, trichloroethylene, and tetrachloroethylene (see Wells AZ07, AZ08, AZ09, DZ08). Failure of these compounds to be confirmed as present in most wells sampled following the day of field-contamination has caused SAIC investigators to not use the high reported concentrations when determining the grand mean of contaminant concentrations within Wells AZ07, AZ08, AZ09, DZ03, DZ07, DZ08, DZ09, and DZ12. Special follow-on sampling of Wells AZ07, AZ08, AZ09, DZ03, and DZ07 was conducted to compensate for the discarded analytical results.

2. Within-well variability, while not statistically tested, appears to be quite small indicating good sampling technique, good laboratory process control, and no significant natural variability.

Eight organic chemicals comprise the bulk of all detected and quantified contaminant types. Three of these chemicals, including dichloromethane (methylene chloride), 1,2-trans-dichloroethylene, and trichloroethylene are

Table 7

FREQUENTLY CONFIRMED VOLATILE ORGANIC CHEMICAL CONCENTRATIONS (as ug/l) IN THE McCHORD AFB, AMERICAN LAKE GARDEN TRACT, AND FORT LEWIS SHALLOW GROUNDWATER SUPPLIES

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 ug/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 ug/l)	Trichloroethylene (Det. Limit 0.12 ug/l)	Tetrachloroethylene (Det. Limit 0.03 ug/l)	Benzene (Det. Limit 0.2 ug/l)	1,1,1-Trichloroethane (Det. Limit 0.03 ug/l)	1,1-Dichloroethane (Det. Limit 0.07 ug/l)	Chloroform (Det. Limit 0.03 ug/l)
AZ07-58	06/03/85	131105/132470	a	350[b]	58[b]	52	*	*	*	*
	06/10/85	131554	*	*	*	*	*	*	*	*
	06/18/85	131945/134879	3.6	nc	nc	*	nc	*	*	*
	06/24/85	132347	*	nc	nc	nc	nc	*	*	*
	07/12/85	133225	*	*	nc	nc	nc	*	*	*
	08/20/85	135167/136122	*	*	1.2	*	5.8	*	*	*
	Mean[c]		0.7	nc	0.2	nc	1.2	*	*	*
AZ08-38	06/03/85	131106/132471	a	5.1[b]	8.3[b]	*	*	*	*	*
	06/10/85	131552	*	*	*	*	*	*	*	*
	06/18/85	131948/134882	nc	*	1.4	*	*	*	*	*
	06/24/85	132348/134420	*	*	1.5	*	*	*	*	*
	07/08/85	133178/134440	*	*	1.4	*	nc	*	*	*
	07/08/85QC	133179	*	*	nc	*	nc	*	*	*
	08/20/85	135164/136119	*	nc	1.5	*	*	*	*	*
	Mean[c]		nc	nc	1.2	*	nc	*	*	*
AZ09-28	06/03/85	131107/132472	a	nc	2.1[b]	*	*	*	*	*
	06/10/85	131544	*	*	*	*	*	*	*	*
	06/18/85	131947/134881	nc	nc	*	*	1.1	*	*	*
	06/24/85	132339/134415	*	*	nc	nc	*	1.5[d]	*	*
	07/12/85[e]	133226	nc	*	*	nc	*	*	*	*
	08/20/85	135165/136120	*	*	1.5	*	4.0	*	*	*
	08/20/85QC	135166/136121	*	*	1.3	*	3.6	*	*	*
	Mean[c]		nc	nc	0.3	nc	1.0	0.3[d]	*	*
AZ09-58	06/03/85	131108/1322473	a	nc	nc	*	*	*	nc	*
	06/10/85	131548	*	*	*	*	*	*	*	*
	06/18/85	131954/134885	4.1	nc	1.8	*	*	*	*	*
	06/24/85	132340/134416	*	*	nc[d]	nc	*	1.8[d]	*	*
	07/12/85	1332271/134825	*	*	1.4	*	nc	*	*	*
	Mean		0.8	nc	0.64	nc	nc	0.36	nc	*
DR01-55	06/03/85	131104/132469	nc	32[f]	15[f]	*	*	*	*	*
	06/25/85	132526/134424	*	23	13[d]	*	*	nc[d]	nc	*
	07/12/85[g]	133219/134822	*	47	17	nc	nc	nc	nc	*
	Mean		nc	34	15	nc	nc	nc	nc	*
DR02-55	06/03/85	131120/132475	nc	*	*	*	*	*	*	*
	06/25/85	13253[illegible]	*	*	*	*	*	*	*	*
	07/12/85	13322[illegible]	*	*	*	*	*	*	*	*
	07/12/85QC	133222	*	nc	*	*	*	*	*	*
	Mean		nc	nc	*	*	*	*	*	*
DR05-45	06/03/85	131096/132461	a	11[b]	8.1[b]	3.3	*	*	*	*
	06/25/85	132527/134427	*	6.0	7.5	*	*	*	nc	*
	07/12/85[h]	133221/134823	*	nc	8.8	nc	nc	*	nc	*
	Mean		*	5.7	8.1	1.1	nc	*	nc	*

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Table 7 (cont'd)

* Not detected at reported detection limits
nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 µg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 µg/l)	Trichloroethylene (Det. Limit 0.12 µg/l)	Tetrachloroethylene (Det. Limit 0.03 µg/l)	Benzene (Det. Limit 0.2 µg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 µg/l)	1,1-Dichloroethane (Det. Limit 0.07 µg/l)	Chloroform (Det. Limit 0.03 µg/l)
DZ03-13	06/03/85	131093/132458	a	*	nc	6.7	*	*	*	*
	08/20/85	135168/136123	*	*	1.6	*	0.6	*	*	*
	Mean[c]		*	*	1.6	*	0.6	*	*	*
DZ03-40	06/03/85	131092/132457	a	nc	1.9[b,d]	*	*	nc[d]	*	nc
	08/20/85	135169/136124	*	*	1.6	*	*	*	*	*
	Mean[c]		*	*	1.6	*	*	*	*	*
DZ07-30	06/03/85	131101/132466	a	240[b]	41[b]	*	*	*	*	*
	08/20/85	135170/136125	*	33	10	*	*	*	*	*
	Mean[c]		*	33	10	*	*	*	*	*
DZ08-22	06/03/85	131103/132468	a	5.3[b]	nc	*	*	*	*	*
	06/11/85	131595	*	*	*	*	*	*	*	*
	07/08/85	133180	*	*	*	*	*	*	*	*
	07/14/85	133368	nc	*	nc	nc	*	*	*	*
	07/18/85	133442	nc	*	nc	nc	nc	*	*	nc
	Mean[c]		nc	*	nc	nc	nc	*	*	nc
DZ09-13	06/03/85	131095/132460	a	110[b]	26[b]	5.3	*	*	*	*
	06/10/85	131551/134432	nc	340	44	*	*	*	*	*
	06/18/85	131951/134884	14	310	55	nc	0.47	nc	nc	*
	06/24/85	132341/134417	8.4	97	36[b]	*	*	*	nc	*
	07/10/85	133187/134932	*	110	36	*	0.95	nc	nc	*
	Mean[c]		4.5	190	40	nc	0.3	nc	nc	*
DZ09-53	06/03/85[i]	131094/132459	a	510[b]	84[b,d]	1.9	*	nc[d]	nc	*
	06/10/85	131549/134431	*	530	85	*	*	*	*	*
	06/18/85[j]	131950/134883	nc	410	86	nc	*	nc	nc	*
	06/24/85	132342/134418	*	200	92	*	*	*	*	*
	07/10/85	133188/134933	*	110	63	*	0.31	nc	nc	*
	Mean[c]		nc	350	82	nc	0.06	nc	nc	*
DZ10-13	06/03/85	131097/132462	a	*	nc	nc	*	*	*	*
	06/10/85	131546	*	*	*	*	*	*	*	*
	06/18/85	131955/134906	nc	*	nc	*	0.64	*	*	*
	06/18/85QC	131949	*	*	nc	*	*	*	*	*
	06/24/85	132344	*	*	nc	nc	*	nc	*	*
	06/24/85QC	132343	nc	*	nc	nc	*	nc	*	*
	07/10/85	133191	*	*	nc	*	*	nc	*	*
	Mean		nc	*	nc	nc	0.06	nc	*	*
DZ10-63	06/03/85	131098/132463	a	*	nc	*	*	*	*	*
	06/10/85	131545	*	*	*	*	*	*	*	*
	06/18/85	131953	*	nc	nc	nc	*	*	*	*
	06/24/85	132345/134419	*	nc	1.3[d]	nc	*	nc[d]	*	*
	07/10/85	133190	*	*	nc	*	*	*	*	*
	Mean		*	nc	0.26[d]	nc	*	nc	*	*

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Table 7 (cont'd)

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 μg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 μg/l)	Trichloroethylene (Det. Limit 0.12 μg/l)	Tetrachloroethylene (Det. Limit 0.03 μg/l)	Benzene (Det. Limit 0.2 μg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 μg/l)	1,1-Dichloroethane (Det. Limit 0.07 μg/l)	Chloroform (Det. Limit 0.03 μg/l)
DZ11-33	06/03/85	131099/132464	a	*	*	nc	*	nc	*	*
	06/10/85	131547	*	*	*	*	*	*	*	*
	06/18/85	131952	nc	*	*	*	*	*	*	*
	06/24/85	132346	*	*	*	*	*	*	*	*
	07/08/85	133176	*	*	*	*	*	*	*	*
	Mean		nc	*	*	nc	*	nc	*	*
DZ12-73	06/03/85	131102/132467	a	190[b]	*	*	*	*	*	*
	06/10/85	131550	*	*	*	*	*	*	*	*
	06/10/85QC	131553	*	*	*	*	*	*	*	*
	06/18/85	131946/134880	9.6	*	nc	*	*	*	*	*
	06/24/85	132351	*	*	*	*	*	nc	*	*
	07/10/85	133189	*	*	*	*	nc	*	*	*
	Mean[c]		2.4	*	nc	*	nc	nc	*	*
DZ13-25	06/03/85	131100/132465	a	26[b]	11[b]	*	*	*	*	*
	06/11/85[k]	131596/132476	nc	37	9.0	*	*	*	*	nc
	06/18/85	131956/134886	15	28	9.7	*	nc	nc	nc	*
	06/24/85	132350/134422	*	16	9.3[d]	*	0.31	nc[d]	nc	*
	06/24/85QC	132349/134421	*	19	1.2[d]	*	*	nc[d]	nc	*
	07/08/85	133175/134439	*	22	13	*	1.9	*	nc	*
	Mean		3	26	9.6	*	0.41	nc	nc	nc
DZ14-63	06/19/85	132105	*	*	*	*	*	nc	*	*
	06/19/85QC	132103/134412	3.3	*	*	*	*	11	*	*
	06/24/85	132352	*	*	*	*	*	*	*	*
	07/01/85	132712	*	*	*	*	*	*	*	*
	07/10/85	133192	*	*	*	*	*	*	*	*
	07/14/85	133367	*	*	*	*	*	*	*	*
	Mean		0.34	*	*	*	*	1.8	*	*
LZ01-43	07/01/85	132715	*	*	nc	*	*	*	*	*
	07/10/85	133204	*	nc	nc	*	nc	*	*	*
	07/14/85	133374	*	nc	*	*	*	*	*	*
	07/14/85QC	133382	*	nc	*	*	nc	*	*	*
	07/16/85	133485	*	nc	*	*	nc	*	*	*
	07/18/85	133544	*	*	*	*	*	*	*	*
	Mean		*	nc	nc	*	nc	*	*	*
LZ02-23	07/01/85	132722/134437	*	1.8	23	0.10	nc	*	*	*
	07/09/85	133202/134812	*	1.3	18	*	*	nc	*	*
	07/09/85QC	133203/134811	*	1.4	19	*	nc	nc	*	*
	07/14/85	133375/134814	*	1.5	23	*	nc	nc	*	*
	07/16/85	133486/134818	*	1.6	22	*	nc	*	*	*
	07/18/85	133545/134821	*	1.2	20	*	*	*	*	*
	Mean		*	1.5	21	0.02m	nc	nc	*	*
LZ03-39	07/01/85	132718	*	*	*	*	*	*	*	*
	07/10/85	1331971/134807	*	*	*	*	1.9	*	*	*
	07/14/85	133380	*	*	*	*	*	*	*	*
	07/16/85	133487/Run #194	*	*	*	*	nc	*	*	*
	07/18/85	133546	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	0.4	*	*	*

SAIC

Table 7 (cont'd)

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 µg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 µg/l)	Trichloroethylene (Det. Limit 0.12 µg/l)	Tetrachloroethylene (Det. Limit 0.03 µg/l)	Benzene (Det. Limit 0.2 µg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 µg/l)	1,1-Dichloroethane (Det. Limit 0.07 µg/l)	Chloroform (Det. Limit 0.03 µg/l)
LZ04-58	07/01/85	132713	*	*	*	*	nc	*	*	*
	07/10/85	133205	*	*	*	*	nc	*	*	*
	07/14/85	133381	*	*	*	*	nc	*	*	*
	07/14/85QC	133383	*	*	*	*	*	*	*	*
	07/16/85	133488	*	*	*	*	*	*	*	*
	07/18/85	133548	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	nc	*	*	*
TZ01-65	06/19/85	132106	*	*	*	*	*	nc	*	*
	06/25/85	132525	*	*	*	*	nc	*	*	*
	07/01/85	132719	*	*	*	*	*	*	*	*
	07/08/85	133201	*	*	*	*	*	*	*	*
	07/14/85	133417/Run #193	*	*	*	*	nc	*	*	*
	Mean		*	*	*	*	nc	nc	*	*
TZ02-57	06/19/85	132107/134414	*	12	*	*	1.2	nc	*	*
	06/25/85	132531/134426	*	14	*	*	0.26	*	*	nc
	07/01/85	132717/134434	*	14	nc	*	*	*	nc	*
	07/12/85	133213/134810	*	12	nc	*	nc	*	*	*
	07/14/85	133369/134813	*	17	nc	*	2.6	*	*	*
	Mean		*	14	nc	*	1.2	nc	nc	nc
TZ03-58	06/19/85	132099/134409	5.7	*	*	*	*	3.1	*	*
	06/19/85QC	132104/134413	nc	*	*	*	nc	1.0	*	*
	06/25/85	132524	*	*	*	*	*	*	*	*
	07/01/85	132716	*	*	*	*	*	*	*	*
	07/09/85	133200/134809	*	*	*	*	*	4.7	*	*
	07/14/85	133378	*	*	*	*	nc	*	*	*
	Mean		0.6	*	*	*	nc	1.3	*	*
TZ04-28	06/19/85	132102/134411	*	0.35	nc[d]	*	*	18[d]	*	*
	06/25/85	132354/134423	*	0.35	6.3	*	0.78	*	*	*
	07/01/85	132714/134433	*	0.29	7.2	*	*	*	*	*
	07/01/85QC	132720/134435	*	0.36	6.3	*	*	*	*	*
	07/09/85	133198/134808	*	0.32	5.8	*	*	*	*	*
	07/14/85	133377/134816	*	0.29	5.9	*	*	*	*	*
	Mean		*	0.33	5.0	*	0.16	3.6	*	*
TZ05-38	06/19/85	132101/134410	*	0.39	nc	nc	*	10[d]	*	*
	06/25/85	132528/134425	*	0.30	3.9	*	*	*	*	*
	07/01/85	132724/134436	*	0.34	4.4	*	*	*	*	*
	07/10/85	133196/134806	*	0.30	4.8	*	2.0	*	*	*
	07/14/85	133376/134815	*	0.25	5.3	*	0.73	*	*	*
	Mean		*	0.36	3.7	nc	0.55	2	*	*
TZ06-60	06/19/85	132097	*	*	*	*	*	*	*	*
	06/19/85QC	132100	*	*	*	*	*	nc	*	*
	06/25/85	132353	*	*	*	*	nc	*	*	*
	07/01/85	132723	*	*	*	*	*	*	*	*
	07/12/85	133214	*	*	*	*	*	*	*	*
	07/14/85	133372	*	*	nc	*	*	*	*	*
	Mean		*	*	nc	*	nc	nc	*	*

Table 7 (cont'd)

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 µg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 µg/l)	Trichloroethylene (Det. Limit 0.12 µg/l)	Tetrachloroethylene (Det. Limit 0.03 µg/l)	Benzene (Det. Limit 0.2 µg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 µg/l)	1,1-Dichloroethane (Det. Limit 0.07 µg/l)	Chloroform (Det. Limit 0.03 µg/l)
TZ07-43	06/19/85	132098/134408	*	*	*	*	1.8	0.17	*	*
	06/25/85[n]	132532	*	*	*	*	*	*	*	*
	06/25/85QC	132529	*	*	*	*	nc	*	*	*
	07/01/85	132721	*	*	*	*	*	*	*	*
	07/10/85	133193	*	*	*	*	*	*	*	*
	07/14/85	133370	*	*	nc	*	*	*	*	*
	Mean		*	*	nc	*	0.36	0.03	*	*
TZ08-38	07/10/85	133195	*	nc	nc	*	nc	*	*	*
	07/12/85	133218	*	*	*	*	*	*	*	*
	07/14/85	133379/134817	*	*	*	*	0.7	*	*	*
	07/16/85	133489	*	*	*	*	*	*	*	*
	07/16/85QC	133494	*	*	*	*	*	*	*	*
	07/18/85	133538	*	*	*	*	*	*	*	*
	Mean		*	nc	nc	*	0.15[m]	*	*	*
TZ09-38	07/10/85	133194	*	*	*	*	*	*	*	*
	07/12/85	133215	*	*	*		*	*	*	*
	07/14/85	133371	*	*	*	*	*	*	*	*
	07/16/85	133490	*	*	*	*	*	*		*
	07/18/85	133539	*	*	*	*	*	*		*
	Mean		*	*	*	*	*	*	*	*
TZ10-48	07/10/85	133199	*	*	*	*	*	*	*	*
	07/12/85	133216	*	*	*	*	*	*	*	*
	07/14/85	133373	*	*	*	*	*	*	*	*
	07/16/85	133491	*	*	*	*	*	*	*	*
	07/16/85QC	133495	*	*	*	*	*	*	*	*
	07/18/85	133540	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	*	*	*	*
TZ11-33	07/16/85	133492	*	*	*	*	*	*	*	*
	07/18/85	133541	*	*	*	*	*	*	*	*
	07/22/85	133760	*	*	*	*	*	*	*	*
	07/23/85	133763	*	*	*	*	nc	*	*	*
	07/24/85	133765	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	nc	*	*	*
TZ12-53	07/16/85	133493/134819	*	nc	1.5	*	*	*	*	*
	07/18/85	133542	*	*	nc	*	*	*	*	*
	07/18/85QC	133543/134820	*	*	1.2	*	*	*	*	*
	07/22/85	133761	*	*	nc	*	*	*	*	*
	07/23/85	133764	*	*	nc	*	*	*	*	*
	07/24/85	133766	*	*	nc	*	nc	*	*	*
	Mean		*	*	0.4	*	nc	*	*	*
W1A-100	06/17/85	131960	*	nc	*	*	*	*	*	*
	07/12/85	133223	*	nc	*	*	*	*	*	*
	Mean		*	nc	*	*	*	*	*	*

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Table 7 (cont'd)

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Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 µg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 µg/l)	Trichloroethylene (Det. Limit 0.12 µg/l)	Tetrachloroethylene (Det. Limit 0.03 µg/l)	Benzene (Det. Limit 0.2 µg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 µg/l)	1,1-Dichloroethane (Det. Limit 0.07 µg/l)	Chloroform (Det. Limit 0.03 µg/l)
W1B-78	06/11/85[p]	131597/134804	*	14	1	*	*	*	*	nc
	07/12/85	133236/134832	*	23	nc	*	*	nc	*	*
	07/12/85QC	133231/134828	*	20	nc	*	nc	*	*	*
	Mean		*	18	0.5	*	nc	nc	*	nc
W1C-40	06/11/85	131598/132477	nc	70	7.9	*	*	*	*	nc
	06/11/85QC	131602/134805	*	61	15	*	nc	*	*	*
	07/09/85	133171/134438	*	27	14	*	0.48	nc	nc	*
	Mean		nc	53	12	*	0.16[m]	nc	nc	nc
W2A-38	06/11/85	131599	*	*	*	*	*	*	*	*
	07/12/85	133235	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	*	*	*	*
W2B-19	06/11/85	131600	*	*	*	*	*	*	*	*
	07/12/85	133228	*	*	*	*	*	*	*	*
	07/09/85QC									
	Mean		*	*	*	*	*	*	*	*
W3A-43	06/11/85	131601	*	nc	*	*	*	*	*	nc
	07/09/85[q]	133181	*	nc	nc	*	*	*	*	*
	Mean		*	nc	nc	*	*	*	*	nc
W3B-15	06/17/85	131965/134891	nc	nc	3.2	nc	*	*	*	*
	07/12/85	133234/134831	*	nc	3.5	*	*	nc	*	*
	Mean		nc	nc	3.4	nc	*	nc	*	*
W4A-117	06/11/85	131539	*	*	*	*	*	*	*	*
	06/11/85QC	131555	*	*	*	*	*	*	*	*
	07/09/85	133177	*	*	*	*	*	*	*	*
	07/09/85QC	133185	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	*	*	*	*
W4B-74	06/11/85[r]	131542/134430	*	11	2.8	*	*	*	*	*
	07/12/85	133229/134826	*	5.1	nc	*	*	*	*	*
	Mean		*	8.1	1.4	*	*	*	*	*
W4C-35	06/11/85	131541/134429	*	28	3.8	*	*	*	*	*
	07/12/85	133230/134827	*	32	5.0	*	*	nc	*	*
	Mean		*	30	4.4	*	*	nc	*	*
W5A-43	06/11/85	131543	*	nc	*	*	*	*	*	*
	07/12/85	133224/134824	*	6.8	nc	*	*	*	*	*
	Mean		*	3.4	nc	*	*	*	*	*

Table 7 (cont'd)

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 μg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 μg/l)	Trichloroethylene (Det. Limit 0.12 μg/l)	Tetrachloroethylene (Det. Limit 0.03 μg/l)	Benzene (Det. Limit 0.2 μg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 μg/l)	1,1-Dichloroethane (Det. Limit 0.07 μg/l)	Chloroform (Det. Limit 0.03 μg/l)
W6A-52	06/11/85	131535	*	*	*	*	*	*	*	*
	06/11/85QC	131537/134428	*	*	*	*	2.8	*	*	*
	07/09/85	133182/134441	*	*	*	*	1.1	*	*	*
	Mean		*	*	*	*	1.3	*	*	*
W6B-38	06/11/85	131533	*	*	*	*	*	*	*	*
	07/09/85	133174	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	*	*	*	*
W7A-60	06/11/85	131540	*	*	*	*	nc	*	*	*
	07/09/85	133183	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	nc	*	*	*
W7B-32	06/11/85	131538	*	*	*	*	*	*	*	*
	07/09/85	133184	*	*	*	*	*	*	*	*
	Mean		*	*	*	*	*	*	*	*
W8A-46	06/11/85	131536	*	*	*	*	*	*	*	*
	07/09/85	133186/134931	*	*	1.0	*	0.47	*	*	*
	Mean		*	*	0.5	*	0.24	*	*	*
W8B-32	06/11/85	131534	*	*	*	*	*	*	*	*
	07/09/85	133172	*	nc	*	*	nc	*	*	*
	Mean		*	nc	*	*	nc	*	*	*
6420	06/03/85	131109	nc	*	nc	*	*	*	*	*
	06/03/85[d]	131110	nc	*	nc	*	*	*	*	*
	Mean		nc	*	nc	*	*	*	*	*
6408	06/03/85	131111	nc	*	nc	*	*	*	*	*
	06/03/85[d]	131112	nc	*	nc	*	*	nc	*	*
	Mean		nc	*	nc	*	*	nc	*	*
6712	06/03/85	131113	nc	*	nc	*	*	nc	*	*
	06/03/85[d]	131114	nc	*	nc	*	*	*	*	*
	Mean		nc	*	nc	*	*	nc	*	*
15020	06/03/85	131115	nc	*	nc	*	*	*	*	*
6821	06/03/85	131116	nc	*	nc	*	*	*	*	*
6614	06/03/85	131117	nc	*	nc	*	*	*	*	*
6416	06/03/85	131118	nc	*	nc	*	*	*	*	*

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Table 7 (cont'd)

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 µg/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 µg/l)	Trichloroethylene (Det. Limit 0.12 µg/l)	Tetrachloroethylene (Det. Limit 0.03 µg/l)	Benzene (Det. Limit 0.2 µg/l)	1,1,1-Trichloroethane (Det. Limit 0.03 µg/l)	1,1-Dichloroethane (Det. Limit 0.07 µg/l)	Chloroform (Det. Limit 0.03 µg/l)
6004	06/03/85	131119/132474	nc	*	nc	*	*	*	*	*
6817	06/03/85	131122	nc	*	nc	*	*	*	*	*
6615	06/03/85	131121	nc	*	nc	*	*	*	*	*
LC1-20	06/17/85	131958/134907	38	*	*	*	*	nc	*	*
	07/16/85	133430	*	*	*	*	*	*	*	*
	Mean		19	*	*	*	*	*	*	*
LC1-50	06/17/85	131964	nc	*	nc	nc	*	*	*	*
	07/16/85	133431	*	*	*	*	*	*	nc	*
	Mean		nc	*	nc	nc	*	*	nc	*
LC2-50	06/17/85	131959/134908	27	*	*	*	*	*	*	*
	07/16/85	133432	nc	*	*	*	*	*	*	*
	Mean		14	*	*	*	*	*	*	*
LC3-50	06/17/85	131969/134895	*	*	1.8	*	nc	*	*	*
	07/16/85	133433/134898	*	*	1.9	*	*	*	nc	*
	Mean		*	*	1.9	*	nc	*	nc	*
LC4-20	06/17/85	131963/134890	16	nc	12	nc	nc	*	nc	*
	07/16/85	133434/134899	nc	nc	11.5	*	*	*	*	*
	Mean		8	nc	12	nc	nc	*	nc	*
LC4-50	06/17/85	131966/134892	nc	nc	15	*	nc	*	*	*
	07/16/85[s]	133435/134900	*	nc	22	nc	*	*	*	*
	Mean		nc	nc	19	nc	nc	*	*	nc
LC5-30	08/20/85	135171/136126	*	11	160	nc	*	nc	*	*
LC5-50	06/17/85	131961/134888	22	15	120	nc	nc	nc	nc	nc
	07/16/85	133436/134901	*	18	170	nc	*	nc	nc	nc
	Mean		11	17	150	nc	nc	nc	nc	nc
LC6-28	06/17/85	131962/134889	30	45	180	nc	*	nc	nc	nc
	07/16/85[t]	133437/134902	*	45	260	nc	*	nc	nc	nc
	Mean		15	45	220	nc	*	nc	nc	nc
LC6-50	06/17/85	131967/134893	16	nc	210	nc	*	nc	nc	nc
	07/16/85[u]	133438/134903	*	45	260	nc	*	nc	nc	nc
	Mean		8	23	240	*	*	nc	nc	nc
LC13-30	06/17/85	131957/134887	15	*	0.98	*	*	*	*	*
	07/16/85	133439/134904	*	*	1.8	*	nc	nc	*	*
	Mean		7.5	*	1.4	*	nc	nc	*	*

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Table 7 (cont'd)

* Not detected at reported detection limits

nc Not confirmed in two columns

Well ID and Sample Depth	Sample Date	Lab Sample ID	Methylene Chloride (Det. Limit 0.25 ug/l)	1,2-Trans-dichloroethylene (Det. Limit 0.07 ug/l)	Trichloroethylene (Det. Limit 0.12 ug/l)	Tetrachloroethylene (Det. Limit 0.03 ug/l)	Benzene (Det. Limit 0.2 ug/l)	1,1,1-Trichloroethane (Det. Limit 0.03 ug/l)	1,1-Dichloroethane (Det. Limit 0.07 ug/l)	Chloroform (Det. Limit 0.03 ug/l)
LC13-50	06/17/85	131968/134894	nc	*	1.7	*	*	*	*	nc
	07/16/85	133440/134905	nc	*	1.2	*	*	nc	*	*
	Mean		nc	*	1.5	*	*	nc	*	nc
LC16-16	06/17/85	131970/134896	5.8	nc	13	nc	*	*	*	*
	07/12/85	133232/134829	*	nc	11	*	*	*	*	*
	Mean		2.9	nc	12	nc	*	*	*	*
LC16-50	06/17/85	131971/134897	nc	nc	13	nc	nc	*	*	*
	07/12/85	133233/134830	*	*	13	*	*	*	*	*
	Mean		nc	nc	13	nc	nc	*	*	*
Field Blank	07/09/85	133173	*	*	*	*	*	*	*	*
	07/12/85	133217	*	*	nc	*	*	*	*	*
	07/16/85	133441	*	*	nc	*	*	*	*	nc
	07/18/85	133547	*	*	*	*	*	*	*	*
	07/22/85	133762	*	*	nc	*	*	*	*	*

Notes:

[a] Field sampling error; methylene chloride inadvertently used to rinse bailer.

[b] Chemical compound confirmed in second column but not quantifiable due to large amounts of methylene chloride. Reported value is first column datum.

[c] Mean calculated without data results from 06/03/85 sampling event known to be self-contaminated with high concentration of methylene chloride. See Note a.

[d] Unresolved second column separations of trichloroethylene and 1,1,1-trichloroethane. Sum of concentrations paired with that chemical with the larger concentration as quantified in the first column separation.

[e] Unconfirmed first column toluene (0.5 ug/l).

[f] Confirmed but not quantified in the second column. Reported value is first column datum.

[g] Unconfirmed first column bromodichloromethane (1.1 ug/l).

[h] Unconfirmed first column bromodichloromethane (0.23 ug/l).

[i] Unconfirmed presence of 1,1-dichloroethylene in second column.

[j] Unconfirmed first column 1,1-dichloroethylene (1.4 ug/l); 1,2-dichloroethane (0.14 ug/l); and carbon tetrachloride (0.75 ug/l).

[k] Second column confirmation indicated dibromochloromethane; 1,1,2-trichloroethane; and cis-1,3-dichlopropene as unresolved at 0.05 ug/l.

[m] Mean concentration less than analytical detection limit due to statistical interpretations.

[n] Unconfirmed toluene at 0.6 ug/l

[p] Unconfirmed second column carbon tetrachloride (0.26 ug/l).

[q] Unconfirmed 1,1,2-trichloroethane (1.0 ug/l) and 1,1,2,2-tetrachloroethane (2.0 ug/l).

[r] Unconfirmed second column carbon tetrachloride (6.0 ug/l).

[s] Unconfirmed second column dibromochloromethane (0.11 ug/l) and bromodichloromethane (0.12 ug/l).

[t] Unconfirmed second column 1,2-dichloromethane (0.41 ug/l).

[u] Unconfirmed first column 1,2-dichloroethane (0.39 ug/l).

the most ubiquitous of the contaminant compounds. A brief discussion of the chemicals is presented below. Table 8 lists additional physical and chemical properties of these volatile organic chemicals. Of the eight properties identified, the n-octanol/water partitioning coefficient is the least commonly recognized. It is significant in that many chemicals have low water solubility but high solubility in nonpolar solvents (lipophilicity). Organisms in contact with a solution of chemical that has a high partition coefficient (e.g., chlorinated pesticide) will act as a nonpolar phase of the binary system and accumulate it through a partitioning process. All of the eight volatile organics have a low partitioning coefficient, however, indicating a low level of bioaccumulation.

Dichloromethane (methylene chloride) is a solvent that is widely used for degreasing, paint stripping, and other industrial applications. It is used on McChord AFB in airplane maintenance. Its use in the Fort Lewis Logistics Center is unknown. Methylene chloride is highly volatile, and is readily degraded by bacteria. The extent to which methylene chloride enters groundwater is unknown. However, the potential for migration is high because it does not readily absorb to clay, limestone, and/or peat moss and its retention in soil is unlikely (Dilling, 1975). Methylene chloride is one of the least toxic chlorinated methanes. There is no evidence of significant bioaccumulation of methylene chloride in the food chain, and it is believed to have low toxicity to aquatic organisms. While considerable attention is being given to methylene chloride as a possible carcinogen, neither the U.S. EPA nor the Tacoma Pierce County Health Department (TPCHD) have proposed maximum contaminant levels for methylene chloride in drinking water.

1,2-Trans-dichloroethylene is a general solvent for organic materials, lacquers, and plastics. It is only slightly soluble in water, but decomposes slowly on exposure to air, light, and moisture. Highly flammable, its specific gravity of 1.257 would allow the chemical to slowly sink in the groundwater aquifer. Both the cis- and trans-isomers of dichloroethylene have been detected on McChord AFB in previous studies. Its use as a solvent or disposal as a waste on either McChord AFB or Fort Lewis is unknown. On November 13, 1985 the EPA published a proposed 70 ug/l recommended maximum contaminant level (RMCL) for the compound (50FR 46936). The TPCHD is, however, implementing a drinking water health risk action level of 27 ug/l for 1,2-trans-dichloroethylene.

Trichloroethylene is a powerful solvent widely used in the industrial degreasing of metals. The chemical has been used in great quantities and for several years both on McChord AFB and on Fort Lewis. There is presently no known use of raw trichloroethylene on McChord AFB. Highly volatile, it is miscible with a variety of solvents. An occupational hazard exists via inhalation of vapors when working with the

Table 8

PHYSICAL AND CHEMICAL PROPERTIES OF VOLATILE ORGANIC CHEMICALS OF INTEREST IN THE AMERICAN LAKE GARDEN TRACT

Property	Benzene (C_6H_6)	1,1-Dichloro-ethane ($C_2H_4Cl_2$)	Dichloromethane (CH_2Cl_2)	1,2-Trans-Dichloroethylene ($C_2H_2Cl_2$)	Tetrachloro-ethylene (C_2Cl_4)	1,1,1-Trichloro-ethane ($C_2H_3Cl_3$)	Trichloroethylene (C_2HCl_3)	Trichloromethane ($CHCl_3$)	Reference
Molecular Weight (gm/Mole)	78	99	85	97	166	134	132	120	---
Density (gm/ml)	0.88	1.18	1.33	1.26	1.62	1.34	1.46	1.48	Weast
Boiling Point (°C atm)	80	57.3	40	48	121	74.1	86.7	61.7	Kavanaugh
Solubility (mg/l)	1,780	5,500	19,400	6,300	140	4,400	1,100	8,200	Callahan
n-Octanol/Water Partitioning Coefficient	1.95	1.79	1.25	1.48	2.88	2.17	2.29	1.97	Callahan
Vapor Pressure °C (at 1 atm unless otherwise noted)	80.1	57.3	40.7[a]	47.8[a]	120.8[a]	74.1[a]	86.7[a]	61.3	Weast
Henry's Constant (atm)	240	NA[b]	NA[b]	NA[b]	1,100	400	550	170	Kavanaugh
ΔH° (K cal/K mole)	3,900	3,780	3,680	NA[b]	4,290	3,960	3,410	4,000	Kavanaugh

[a]Temperature in °C at 760 mm Hg.

[b]Information not available in Weast, Callahan, or Kavanaugh.

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chemical. Ingestion of drinking water is a secondary source of exposure. When ingested, trichloroethylene is passed to the liver where it is metabolized into breakdown products. Trichloroethylene is known to cause liver dysfunction and to impair motor control and the central nervous system at high concentrations (greater than 1,000 ppm). Trichloroethylene has also been shown to be a possible human carcinogen. Because of these health effects, the U.S. EPA has proposed that trichloroethylene be regulated as a drinking water contaminant. The November 13, 1985 proposed RMCL is 0 ug/l and the proposed enforceable maximum contaminant level is 5 ug/l (50FR 46902). Meanwhile, the TPCHD is recommending that trichloroethylene not exceed a health risk action level of 2.7 ug/l.

Tetrachloroethylene frquently called perchloroethylene or perc, is a nonflammable solvent of many organic compounds. As such, two-thirds of all produced perc is used in the dry cleaning industry. The second largest market of the chemical is in metal degreasing. Tetrachloroethylene has been used on McChord AFB in aircraft maintenance but quantities are unknown (CH2M HILL, 1982). Some of the waste solvents were reported to have been disposed in on-base landfills up to 1960. It is unknown if tetrachloroethylene is used on Fort Lewis. The EPA has promulgated a drinking water recommended maximum contaminant level (RMCL) of zero for this chemical. The TPCHD has neither adopted this RMCL nor imposed its own limit.

Benzene is a volatile aromatic hydrocarbon and while usable as a solvent is more a feedstock chemical. Benzene, along with other light, high octane aromatic hydrocarbons such as toluene and the xylenes, is a component of motor gasoline. Its presence in the environment may be a consequence of gasoline spills or leaking underground storage tanks. Benzene is a poisonous substance with both acute and chronic toxic effects. Like several of the chlorinated hydrocarbons, the U.S. EPA has promulgated a drinking water RMCL of zero. The TPCHD has not yet adopted a drinking water standard.

1,1-Dichloroethane and 1,1,1-Trichloroethane are industrial organic solvents. They both are the least toxic of the chloroethanes. However, their use is discouraged due to their still high toxicity. The IRP Phase I report for McChord AFB indicates that multiple users of 1,1,1-trichloroethane may in aggregate waste more than 500 gallons per year. Prior to 1960 this material was either incinerated with waste POL or disposed of at on-base sites (CH2M HILL, 1982). As previously noted, the largest active landfills at the time were in the area of the present golf course. There is no known use of dichloroethane on McChord AFB, or of either chemical on Fort Lewis.

Chloroform (trichloromethane) is an organic used in fluorocarbon refrigerants and a component in plastics, solvents, fumigants, and insecticides. It is also a byproduct from the chlorination of methane. Chloroform is a known carcinogen, and is toxic by inhalation or ingestion. There are no reported uses of chloroform on either military installation. Brominated chloromethanes have been used by the McChord AFB fire department, however, and may have been in waste streams discharged to storm drains or groundwater as late as 1974 (CH2M HILL, 1982). In the presence of free chlorine, bromide ions may

be substituted and form chloroform. Similarly, free chlorine may react with methane generated in old landfills, septic tank drain-fields, marshes and peat bogs, or other areas containing a high organic content.

4.3.3 Contaminant Distribution and Source Identification

The volatile organic chemical data in Table 7 are presented as histograms on Plate 4. The three contaminants most frequently detected, including 1,2-trans-dichloroethylene, trichloroethylene, and benzene, are presented as separate histograms. All other quantified organics are summed and reported as "other organics." The calculated mean concentrations for the three singular compounds are indicated above each histogram, while the sum of all "other organics" compounds concentrations is indicated above the fourth and last histogram. The depth to the water sample and the mean temperature and specific conductance data are identified below each histogram for each well sampled. Finally, the reader should note that multiple histograms are prepared for nested or cluster wells that are indicated by a single well designation. For example, EPA Well W-1 actually consists of three nested wells in a single borehole; each sampled well generating its own histogram of volatile organic chemical contaminants and temperature and specific conductance means.

The spatial distribution of 1,2-trans-dichloroethylene, methylene chloride, and trichloroethylene in groundwaters indicates two major and distinct contamination patterns. The presence and distribution of volatile organics other than those three indicate other possible low grade sources of contamination. A greater discussion of each contamination pattern is presented below by geographic area.

McChord AFB

Groundwater contamination by chlorinated hydrocarbons is exhibited on McChord AFB beneath the western end of the golf course, alongside the north flank of Westcott Hills, and among private residences in the northeast corner and northern boundary of the American Lake Garden Tract. Groundwater monitoring wells located north, south, and west of the munitions storage area, plus those constructed within or near the golf course indicate that the source of organic contaminants are in one or more of the closed landfills in the southeast corner of the golf course.

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Groundwater monitoring data and hydrogeologic interpretations indicate that 1,2-trans-dichloroethylene and trichloroethylene are migrating westward. The chemical signature of the contaminated groundwater has 1,2-trans-dichloroethylene at concentrations five to tenfold higher than trichloroethylene concentrations. Based in part on soil gas analyses and on groundwater sampling from more than 15 wells, the axis of the plume as it crosses the McChord AFB property line is on a southwest alignment extending from just north of the Base Housing Gate guard house towards EPA Well W-1 (see Figure 13). The zone of highest chemical contamination appears to be 40 to 70 feet below the ground surface (200 to 230 feet mean sea level) as indicated by chemical analyses on water samples taken in Wells DZ09 (53 ft), DR01 (55 ft), EPA W1B (78 ft), EPA W1C (40 ft), EPA W4C (35 ft), and EPA W8A (46 ft). Groundwater samples taken in wells with screen zones at 100 or more feet below the ground surface were free of the organic contaminants. Tacoma Pierce County Health Department drinking water health risk action levels for trichloroethylene (2.7 ug/l) and 1,2-trans-dichloroethylene (27 ug/l) are exceeded in groundwater on some private properties adjacent to the Air Force Base. Monitoring Well DZ09 near the golf course landfill has been tested and demonstrated to have organic contaminant concentration exceeding local drinking water criteria by tenfold.

The leading edge of the contaminant plume is estimated to be approximately 800 feet west of Woodbrook Drive. This estimate is based on interpretations using electrical resistivity and self-potential data and results of groundwater sampling in Wells EPA W6 (A and B), EPA W8 (A and B), TZ01, TZ03, and TZ12. Soil gas analyses, plus groundwater monitoring of wells near the Base Housing Gate, suggest that the plume is not more than 250 feet wide as it crosses the Air Force Base boundary. Separation distances between Wells TZ01, EPA W6, and EPA W8 also suggest the plume does not widen. Figure 14 is an estimate of the extent of the plume containing 1,2-trans-dichloroethylene and trichloroethylene.

The origin of the plume is attributed to the landfill beneath golf course Fairways 8, 9, and 10 and the existing driving range. This landfill is suspected over those to the east and southeast because reports indicate that it was open longer and accepted industrial wastes whereas those closer to Lincoln Boulevard or Fairway Drive were generally limited to rubble or fill material

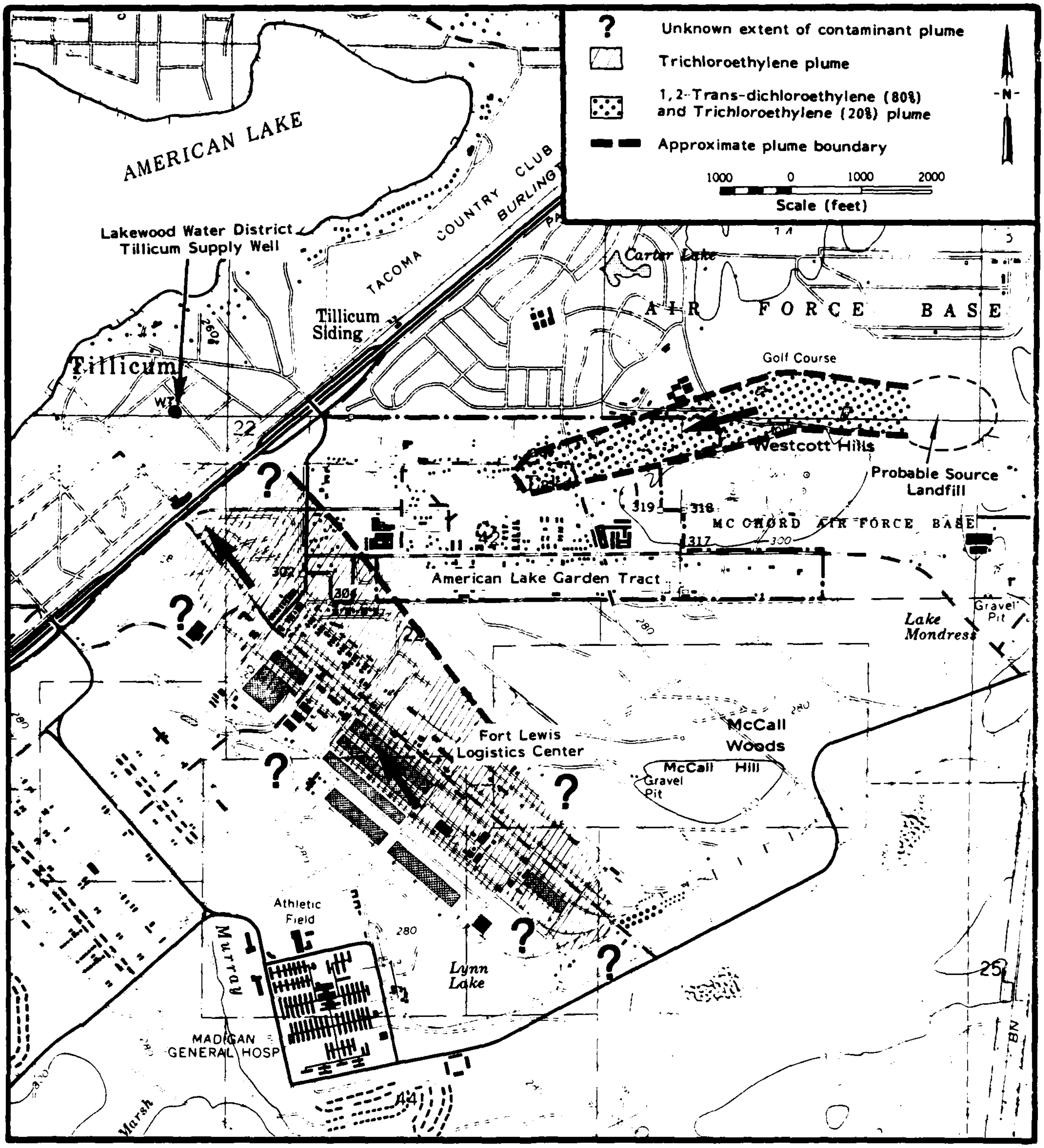

Figure 14

APPROXIMATED BOUNDARIES OF TCE AND 1,2-TRANS-DICHLOROETHYLENE
CONTAMINANT PLUMES IN THE AMERICAN LAKE GARDEN TRACT
STUDY AREA AS PRESENTED ON PLATE 4

(CH2M HILL, 1982). It is anticipated the plume exits the landfill in a west or northwest direction before turning towards the Base Housing Gate area. This hypothesis is based upon predicted regional groundwater movement, self-potential groundwater analyses, localized channeling as mapped by seismic refraction, presence and shape of the till unit in the local area, and the fact that water pumped from Wells DR02 and DR03 west and south of the golf course clubhouse continuously tested free of volatile organic chemicals over a two-month pumping period during the IRP Phase II (Stage 2) investigations (SAIC, 1985). In addition, monitoring wells constructed south and east of the landfills (specifically DZ14 and DR04) have consistently produced water free of volatile organic chemical contamination; and other monitoring wells constructed during IRP Phase II investigations in Areas E and J to the east of the landfills were analyzed to not have groundwater contamination by either trichloroethylene or 1,2-trans-dichloroethylene (JRB, 1983; SAIC, 1985).

Fort Lewis Logistics Center

U.S. Army properties upon or near the south end of the Fort Lewis Logistics Center are the apparent source of trichloroethylene contamination of groundwater beneath the Logistics Center and across the southwest corner of the American Lake Garden Tract. Figure 14 shows the estimated eastern flank of a contaminant plume which is most likely moving in a northwest direction. The northern, western, and southern limits of the plume are unknown. However, testing of Well LC12 (at the north extreme of the Logistics Center) by the U.S. Army indicates the presence of trichloroethylene in groundwater. In addition, preliminary testing of private water supply wells in the Tillicum area north of Interstate 5 indicate contamination of groundwater by both trichloroethylene and 1,2-trans-dichloroethylene (see Appendix H.1). The public water supply well in Tillicum has, however, been tested to be free of chlorinated hydrocarbons at this time. While the contaminant types are similar, it is premature to suggest that the contamination problems in Tillicum are related to those confirmed in the Logistics Center and the Garden Tract until more testing has been accomplished on both sides of the interstate highway.

Well LC5 (see Plate 4) tested in this study indicates high TCE concentrations and suggests the western boundary of the plume has not yet been defined.

Similarly, the southern limits and probable source(s) have not yet been confirmed. Soil gas analyses conducted on drill cuttings collected in Boreholes LC22 through LC28 confirm that TCE contamination extends as far south as Old Landfill No. 2 (Farr, et al., 1985). Testing of the cutting materials suggests, however, that the apparent source of TCE contamination is not within the confines of Old Landfill No. 2 but instead may be to the west or southwest of the landfill site. This interpretation is made on the basis of confirmed contaminated cuttings taken from Boreholes LC23, LC25, and LC27 west and northwest of the landfill, while Boreholes LC22, LC24, and LC26 south and northeast of the landfill tested free of TCE contamination.

Groundwater contamination in the Logistics Center is also best represented by trichloroethylene and 1,2-trans-dichloroethylene. Unlike groundwater contamination at McChord AFB, however, TCE concentrations are ten to twenty-fold higher than 1,2-trans-dichloroethylene concentrations. TCE concentrations increase dramatically as one moves south in the Logistics Center. TCE concentrations as measured in Wells LC5 and LC6 exceed by almost 100-fold the drinking water guidelines currently imposed by the local health department. The source of the apparent increasing contaminant concentration in the southward direction could not be confirmed due to the absence of qualitative and quantitative groundwater data from Wells LC17 through LC28. Preliminary chemical analyses performed for the U.S. Army in August 1985 using head space methods indicates that groundwater samples collected from wells in the center of the Logistics Center and near the closed landfill are contaminated with trichloroethylene (Bruya, 1985). The data from this investigation are provided in Appendix H.2. In consideration of the work performed by SAIC and Bruya, land surfaces west and southwest of Old Landfill No. 2 and DRMOL activities at the south end of the Logistics Center should be carefully examined.

Methylene chloride was quantified in many water samples collected 17 June but was either absent or unconfirmed in samples collected during July 1985. Unfortunately, no field blank sample was analyzed for the June sampling date. However, field records do not indicate that methylene chloride was mistakenly used during sample collection. In addition, not all samples taken in the Logistics Center on 17 June contained methylene chloride. In particular, Wells LC1, LC3, LC4, and LC13 (at 50 feet) were free of detected or confirmed

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methylene chloride. The absence of repeated presence in July, however, causes us to recommend additional sampling before identifying methylene chloride as another chemical of concern in the Logistics Center.

Central American Lake Garden Tract

Trace level concentrations (i.e., less than 1 ug/l) of benzene are detected in groundwater samples collected in wells closest to the McChord AFB golf course landfills, and in wells down the length of the north side of the American Lake Garden Tract. There is an absence of benzene in all wells drilled near the McChord AFB Base Housing Gate. Groundwater samples taken in Wells TZ02 and EPA 6 yielded the highest and most frequently confirmed presence of benzene. This implies a second source of benzene contamination within the Garden Tract. Wells TZ02 and EPA 6 are constructed near the Woodbrook shopping area and a closed gasoline service station. It is suspected but not confirmed that the source of benzene is related to historical activities at the service station and could include leaking underground fuel storage, surface spills, or surface runoff from parking and pavement areas. However, no petroleum product was observed on the water table, and no gasoline or other hydrocarbon vapors were detected during borehole drilling.

4.3.4 Uncontaminated Groundwater in the American Lake Garden Tract

Despite confirmation of groundwater contamination in opposing corners of the Garden Tract, the Stage 1 investigations have also established that groundwater quality in the southeast corner and the broad expanse across the central and northwest portions of the Garden Tract have no detected or no confirmed contamination by volatile organic chemicals. Replicated sampling of domestic water supplies along 150th Street S.W., plus installation of two monitoring wells on Army property (LZ03, LZ04) and seven within the Garden Tract (TZ01 and TZ06 through TZ11) almost always were free of any detected volatile organics. Well TZ12 located at Woodbrook Drive and 150th Street S.E., however, was found to have quantifiable TCE (1.5 and 1.2 ug/l) on two of five sampling events, and detected but unconfirmed presence of TCE in all other samples. The significance of the presence of TCE at this location is unknown. Again, however, Well TZ12 is within 300 feet of an existing gasoline service and vehicle maintenance shop. Wells EPA W-6, TZ07, and TZ06 are all located

hydraulically downgradient of the Woodbrook shopping area and the active service station and also have, on occasion, detected but unconfirmed quantities of benzenes.

4.4 SUMMARY OF RESULTS AND FINDINGS

In continuance of the USAF Installation Restoration Program at McChord AFB, and in coordination with remedial investigations past or present conducted by the U.S. Environmental Protection Agency and the U.S. Army, a Phase II (Stage 1) Confirmation/Quantification Investigation was performed to evaluate groundwater flow and quality across the American Lake Garden Tract. These investigations were extended onto adjacent USAF and USA military installations and into residential areas with confirmed groundwater contamination. These services have been completed and the following conclusions are presented:

1. The American Lake Garden Tract subsurface geology consists of a complex channel pattern in recessional outwash gravels deposited directly on top of advance outwash sands. The Vashon Till unit found beneath McChord AFB does not extend beyond Westcott Hills and is discontinuous or absent beneath the Fort Lewis Logistics Center. Erosion channels or other discontinuities in the Vashon Till provide direct hydraulic connection between perched water and the major aquifer. The absence of the dense till unit means there is no geologic unit protecting local groundwater quality from surface activities taking place in the Garden Tract or on military installations bordering the residential community.

2. Regional groundwater flows northwest across the Garden Tract. Glacial outwash channels may influence local groundwater movement through more permeable and sorted gravels. Three broad channels, each made up of several smaller anastomosing channels, are believed to influence groundwater flow across the Garden Tract. The northern most channel carries water westward from McChord AFB; a southeast to northwest channel, the largest of the three, carries the major source of water across the Garden Tract; and a third channel moving northwest along the length of the Fort Lewis Logistics Center transports water across the west end of the Garden Tract.

3. Groundwater quality south and east of the Garden Tract, and within the southeast, central, and northwest portions of the Garden Tract are in general free of volatile organic contaminants at confirmed quantitation levels. There are no known water supply or monitoring wells in these areas which have volatile organic contaminants at concentrations exceeding federal, state, or local health department maximum contaminant health risk action levels. Unless contaminated by harmful bacteria or contaminants other than the volatile organic chemicals tested, the groundwater resource in these areas may continue to be used for domestic purposes.

4. Past landfills beneath the McChord AFB golf course are the probable source of 1,2-trans-dichloroethylene and trichloroethylene contamination in domestic water supply wells along 146th Street S.W. in the northeast corner of the Garden Tract. The contaminant plume appears to be moving in a west-southwest direction towards the center of the Garden Tract. The rate of plume migration has not been determined. The leading edge of the plume is estimated to be 500 to 800 feet west of Woodbrook Drive and centers along or south of 146th Street S.W. The plume width is estimated to be at most 150 to 250 feet wide. The vertical limits of the plume are estimated to be between elevation 200 and 230 feet mean sea level.

5. Past landfill, current waste management practices, defense property reutilization and marketing operations, or other unknown activities on or south of the Fort Lewis Logistics Center is causing trichloroethylene contamination of groundwater. Local groundwaters flow northwest towards American Lake. A small area of the American Lake Garden Tract is affected by the TCE contamination. The areal limits of contamination have not been defined and the vertical extent of contamination is unknown. Groundwater contaminant concentrations are in general higher at the 50-foot depth (225 feet MSL) than near the surface of the water table (elevation 250 MSL) at the north end of the Logistics Center. Existing 60-foot monitoring wells may not be sufficiently deep to define the bottom of the contaminant plume.

5.0 ALTERNATIVE MEASURES

This section presents an evaluation of possible monitoring and remedial response alternatives for continuation of IRP efforts in the American Lake Garden Tract and on the two military installations. The proposed field programs, monitoring plans, and sampling and analytical methodologies are discussed for each of the two areas of groundwater contamination.

Interim remedial measures should be implemented to restore at least for the short term a source of potable water to residents affected by volatile organic chemical contamination of groundwater. At a minimum, this would include continuation of making available bottled water to residents. Site investigations should continue on McChord AFB to isolate the source of chlorinated hydrocarbon solvents. Similar studies should continue on Fort Lewis, with emphasis taken to develop and monitor all wells currently in place. Finally, consideration should begin as to the ultimate responsibilities required to restore groundwater quality in each of the affected areas.

5.1 McCHORD AFB SOURCE IDENTIFICATION

Groundwater chemistry and hydrogeological interpretations indicate that one or more of the inactive base landfills located beneath the southeast corner of the current golf course is the probable source of contamination now occurring in the northeast corner of the American Lake Garden Tract. The most likely location of the buried wastes would be in the landfill beneath the driving range located between Fairways 8, 9, and 10. A high groundwater table in the area possibly indicates that the bottom of the landfill is saturated and that buried wastes are in direct contact with groundwater.

A number of different source identification measures can be employed at McChord AFB to confirm the location of the waste solvents. Included among the identification methodologies are:

- Soil gas surveys to measure volatile emissions in the soil void spaces. Performed in arrays or transects perpendicular to water movement, the soil gas test will define the plume boundary conditions and provide quantitative confirmation of the magnitude of contamination.

- Magnetic surveys across the landfill site to identify possibly buried drums or other steel containers.
- Resistivity profiling to map anomalous soil or water conditions.
- Construction of shallow monitoring wells to perform soil and groundwater testing.
- Ground-penetrating radar to "view" beneath the landfill cover and attempt to identify the mass and shape of buried objects and their approximated depths and proximity to other buried materials.

Recommendations can be made as to source control or elimination once the most probable source type and location has been identified. While excavation may be attractive for source control or elimination if the waste is contained, in situ treatment or withdrawal and treatment of contaminated water may be the remedial action of choice for uncontained or released waste.

5.2 FORT LEWIS SOURCE IDENTIFICATION

Replicated sampling in eight U.S. Army monitoring wells confirms trichloroethylene contamination with a probable source towards the south end of the Logistics Center. The eastern edge of the zone of contaminated groundwater appears to extend beneath the southwest corner of the American Lake Garden Tract. However, because of the unavailability of groundwater chemical characterization data from as many as 28 monitoring wells in the Fort Lewis Logistics Center, SAIC investigators have been unable to define either the source(s) of the contaminant problem or its extent in the south, west, or north directions. It is premature, therefore, to recommend any field program or site discovery actions until a monitoring program has been completed across all historical and newly constructed monitoring wells and a more definitive spatial distribution of contaminants has been established.

5.3 RESTORATION OF THE GROUNDWATER RESOURCES

Improvements in water quality can be achieved through source control and treatment of contaminated water supplies. Current conditions in the Garden Tract include the fact that all water supplies are from the shallow surface aquifer, portions of which have been confirmed as contaminated. Efforts to identify and eliminate the sources of contamination may still leave contaminated groundwater for several years. Given these facts, a number of alternatives can be considered, including:

- Point-of-Use Treatment - Provide point-of-use type activated carbon filters to all residents with known contaminated water supplies or those who potentially may be affected by chlorinated hydrocarbon contaminants. These filters would be installed on all water lines used for consumption, food preparation, washing, and bathing. Filter maintenance could be provided to the affected homeowners until groundwater quality has been restored and the risk of chlorinated hydrocarbon contamination has receded.

- Public Water Supply - Provide all affected residents with public water service. The source of water can be an extension of the Lakewood Water District's laterals or interties with either the Fort Lewis or McChord AFB water supplies.

- Temporary Fixed Water Supply - An evaluation could be performed of remedial cleanup methodologies once the exact location of a contaminant source has been identified on McChord AFB. The construction of an interim (i.e., one to two years) water supply service from existing USAF water mains may be economically attractive if only a short period of time is needed to eliminate the contaminant source and purge and treat the existing contaminated groundwater resource. Figure 15 identifies the locations of an eight-inch water main paralleling the north boundary of the Garden Tract. Water supply transmission loops could perhaps be laid temporarily on the ground surface or buried in a shallow trench. Home service laterals could be connected to the supply lines. The interim water supply service would cease once the source(s) has been eliminated and groundwater quality has returned to safe drinking levels as confirmed in monitoring and water supply wells.

- Deepen Existing Water Supply Wells - Private water supply wells could be deepened or redrilled to penetrate at least 120 feet below the ground surface. Water supplies at that depth are known to be both high in yield and of good quality with no known contamination by volatile organics. Well screens located at 120 feet or deeper

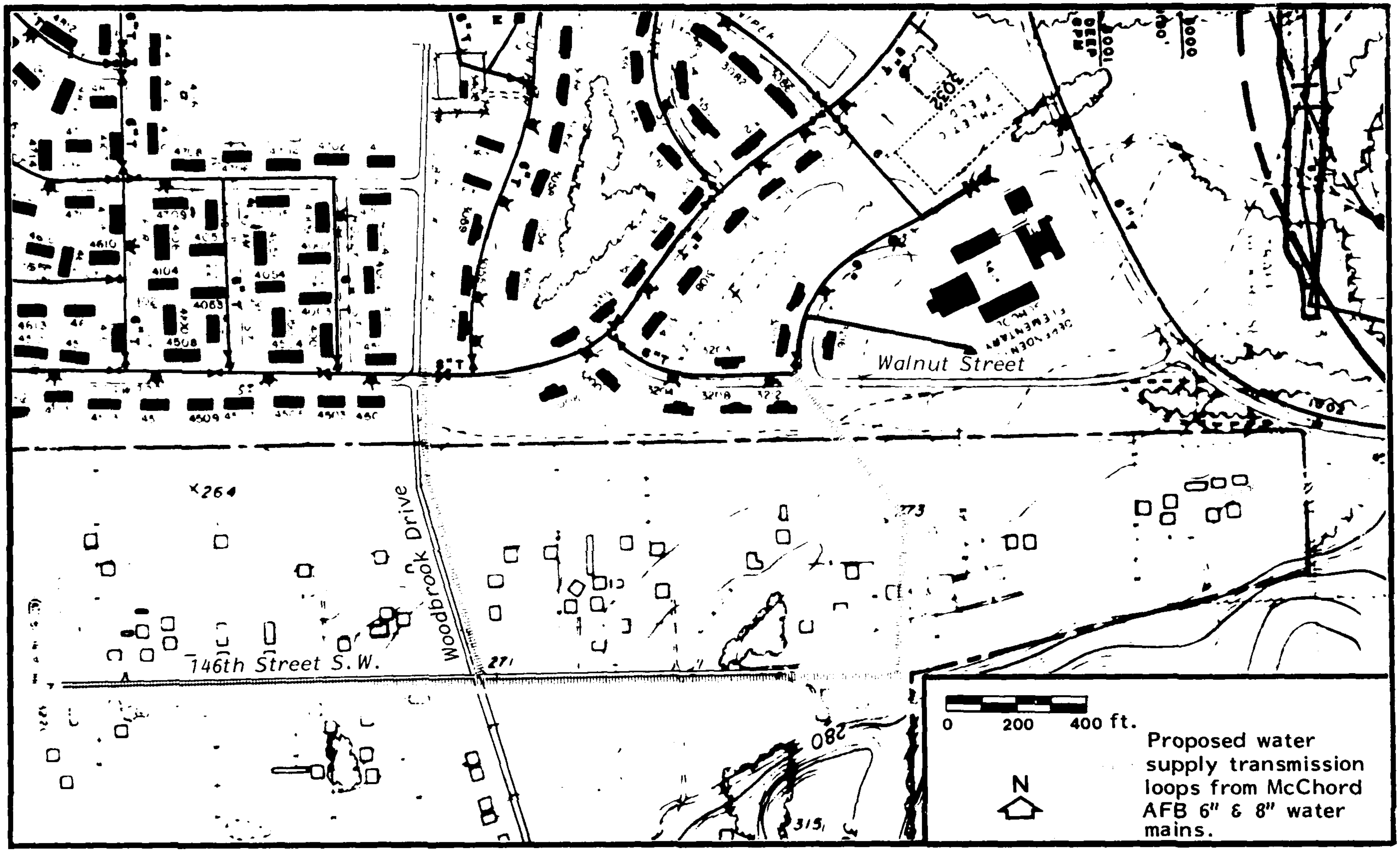

Figure 15

POTENTIAL INTERIM WATER SUPPLY LOOPS FOR THE
NORTHEAST CORNER OF THE AMERICAN LAKE GARDEN TRACT

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will be located at least 50 feet below the existing zone of contamination. Any deep water wells should be sealed above the well screen to eliminate vertical leakage of contaminants through the borehole and into the well screen. Care should be taken that pumping rates in any water supply well or well field not cause drawdown of contaminants from overlying soils or migrating plume.

- Groundwater Extraction and Treatment - A series of groundwater extraction wells placed perpendicular to water movement can act as a cut-off wall to contaminant migration. Groundwater extraction and treatment can be effected using recovery pumps and above surface water treatment systems. Jet aeration, surface sprays, and injection into the golf course irrigation system may prove adequate to air-strip all VOC contaminants. Shilling (1985) reports successful air stripping of VOCs in wells near downtown Tacoma using packed towers and forced aeration. Similarly, air-stripping towers in the Lakewood-Ponders Corner area one mile north of the Garden Tract are removing perchloroethylene from the groundwater at extremely high removal efficiencies.

Groundwater that has been extracted and treated may be discharged into non-overflow marshes and other wetlands on the west end of McChord AFB. Previous groundwater pumping projects found that the kettle depressions and wetlands are openly connected to groundwater and can accommodate several hundreds or perhaps thousands of gallons of water per minute.

6.0 RECOMMENDATIONS

The recently completed Phase II (Stage 1) Confirmation/Quantification Investigation has identified and confirmed two separate groundwater contamination problems in the American Lake Garden Tract, and the available evidence indicates the sources of these problems are on U.S. military installations. A particular source area is suspected as the cause of contamination on McChord AFB while less is known about the source(s) and extent of the problem beneath the Fort Lewis Logistics Center. Site specific recommendations include:

1. The U.S. Air Force should continue to make available potable water to those American Lake Garden Tract residents who request such water service and who reside in the area east of Spring Street and north of a line equal to 148th Street S.W. These boundaries are established to be 150 or more feet beyond the side margin and approximately 1,000 feet downgradient of the estimated leading edge of the contaminant plume.

2. The U.S. Army should make available potable water to those American Lake Garden Tract residents who request such water service and reside in the area west of Spring Street and south of 146th Street S.W. These boundaries are established to be 150 to 400 feet north and east of the side margin of the contaminant plume.

3. The U.S. Army should provide periodic analysis of groundwater from water supply wells which serve the American Lake Secondary School and Brookwood Junior High School. Chemical analyses should include all 36 volatile priority pollutants and specific conductance. This monitoring program should be instituted in lieu of providing an alternative water supply to the schools.

4. Continue site investigations on the McChord AFB golf course landfills to determine the number, size, and location of the contaminant source(s). A number of nondestructive surface techniques can

be used to develop a final plan for the boring of monitoring or recovery wells. The recommended sequence of this field work is as follows:

- Construct a cluster well pair of groundwater monitoring wells east of the golf course landfills between Fairway Drive and the BNRR behind the Base Commissary and gasoline service station. The two wells should be constructed so that the screen zones are centered at 10 feet and 40 feet below the water table. Groundwater samples should be analyzed for volatile organic chemicals, specific conductance, pH, and temperature. These wells will serve to characterize groundwater upgradient of the landfills and possibly identify the apparent anomaly in self-potential data.

- Perform soil gas analyses along linear arrays as shown on Figure 16. Soil gas probes should be centered not more than every 50 feet. Use GC/ECD equipment to quantify 1,2-trans-dichloroethylene or trichloroethylene soil gas concentrations.

- Once the soil gas results have been interpreted, perform magnetometer, electrical resistivity, and/or ground penetrating radar surveys on those portions of the driving range and golf course believed to overlie buried chemical wastes.

- Construct two and possibly three cluster wells hydraulically downgradient of the suspected contaminant source. Each cluster should contain three or more separately drilled and cased monitoring wells screened at different levels in the aquifer. Estimated drilling depths are 30, 50, and 80 feet. Test all groundwaters for volatile organic chemicals.

5. Begin conceptual design of a well field to intercept contaminated groundwater before it leaves McChord AFB. Two or more separate well fields could act as cut-off walls to off-base contaminant migration. Additional wells may need to be constructed along the longitudinal axis of the contaminant plume to allow for monitoring and evaluation of the remedial action efforts. One well field could be constructed near the Base Housing Gate. Surface discharge of water, either raw or treated, is available in a nearby marsh. A second dewatering system could be constructed near the Lincoln Boulevard duck pond. Pump discharge could go to the duck

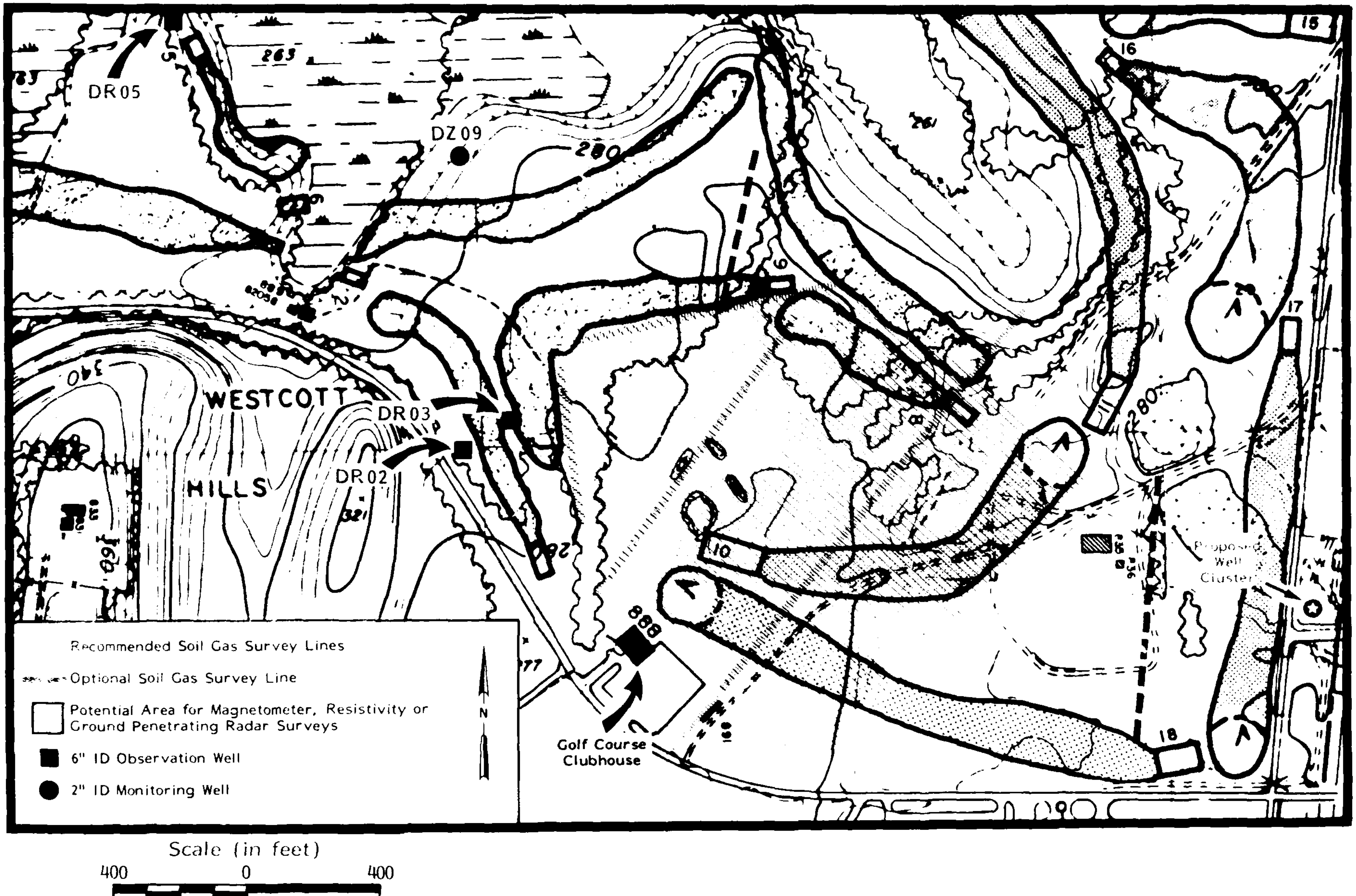

Figure 16

PROPOSED SOIL GAS SURVEY AND GEOPHYSICAL
SURVEY AREA ON McCHORD AFB GOLF COURSE

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pond or marshy area north of the pond. Air-stripping towers may become necessary if surface discharge of untreated groundwater is disallowed. Separate towers can be constructed near each pumping well field, or a central air-stripping system can be installed and recovery well discharges transferred to the stripping tower.

6. It is recommended the U.S. Army develop the existing monitoring wells in the Fort Lewis Logistics Center and expand its current monitoring program such that: (1) static water levels are sounded weekly for up to two months; (2) in situ or grab sample analyses be performed to determine pH, specific conductance, and temperature; (3) sampling be performed at least three times in each well; and (4) water samples be characterized for not less than the 36 EPA volatile organic priority pollutants. Remedial investigations extending beyond the reconnaissance and confirmatory sampling program should emphasize the use of nondestructive geophysical techniques prior to the expansion of the monitoring well network to areas north of Interstate 5 and towards the apparent source(s) of TCE contamination.

APPENDICES

APPENDIX A - References

APPENDIX B - Glossary of Terms and Acronyms

APPENDIX C - Scope of Work

APPENDIX D - Well Construction Summaries and Boring Logs

APPENDIX E - In Situ Monitoring Well and Other Field Data

APPENDIX F - Chemistry Data

APPENDIX G - Seismic Refraction and Electrical Resistivity Data

APPENDIX H - Correspondence with Regulatory and Other Agencies

APPENDIX I - Chain of Custody

APPENDIX J - Safety Plan

APPENDIX K - Biosketches of Key Personnel

APPENDIX A

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APPENDIX B

GLOSSARY OF TERMS AND ACRONYMS

GLOSSARY OF TERMS AND ACRONYMS

AFB - Air Force Base

AFESC- Air Force Engineering and Services Center

ALGT - American Lake Garden Tract; a nonmilitary, residential subdivision located between McChord AFB and Fort Lewis Military Reservation.

Alluvial - Deposited by a stream or running water.

Alluvium - A general term for clay, silt, sand, gravel or similar unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water.

Anastomosing - An adjective describing an interconnected braided or branching network as in a stream channel or blood vessels.

Annulus - The space between the casing in a well and the wall of the hole, or between the drill string and the wall of the hole.

Anthropic - Of or relating to mankind or the period of man's existence in the area.

Aquiclude - A deposit of relatively impermeable rock that is capable of absorbing water slowly but does not transmit it rapidly.

Aquifer - A formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Aquitard - A confining geologic unit that retards but does not prevent the flow of water to or from an adjacent aquifer.

AVGAS - A leaded high octane aviation fuel used by turbo-jet aircraft.

Bentonite - A commercial term applied to any of numerous clay deposits containing montmorillonite as the essential mineral and used chiefly to thicken drilling muds or form a grout based on its ability to swell in water.

BNRR - Burlington Northern Railroad

Cenozoic - An era of geologic time, from the beginning of the Tertiary period (65 million years before the present) to the present.

Contamination - The degradation of soil chemistry or natural water quality to the extent that its usefullness is impaired. There is no implication of any specific limits to water quality since the degree of permissible contamination depends upon the intended end use or uses of the water.

DEQPPM 81-5 - Defense Environmental Quality Program Policy Memorandum 81-5

Disposal Facility - A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at a location at which the waste will remain after closure.

Disposal of Hazardous Waste - The discharge, deposit, injection, dumping, spilling or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

DoD - (United States) Department of Defense

Downwarp - Subsidence of a regional area of the earth's crust.

DRMOL - Defense Reutilization and Marketing Office Lewis; previously included Redistribution and Marketing (R&M) and Salvage.

Dump - An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics. Dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

Effluent - A liquid waste discharged in its natural state from a manufacturing or treatment process. Such waste shall be partially or completely treated.

EPA - (United States) Environmental Protection Agency, or one of 10 regional offices

Erosion - The wearing away of land surface by water or chemical, wind or other physical processes.

Facility - Any land and appurtenances thereon which are used for the treatment, storage and/or disposal of hazardous wastes.

FIS - Fighter Intercept or Squadron

Flow Path - The direction or movement of groundwater as governed principally by the hydraulic gradient.

Fluvial - Of or pertaining to a stream or river; produced or deposited by a stream or river.

Formation - A persistent body of igneous, sedimentary, or metamorphic rock having easily recognizable boundaries that can be identified in the field.

GC - gas chromatograph

GC/ECD - gas chromatograph with an electron capture device

gpm - gallons per minute

Gradient - The degree of inclination or the rate of ascent or descent of a feature such as a stream channel or land surface structure.

Groundwater - Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

HARM - Hazard Assessment Rating Methodology

Hazardous Waste - A solid waste or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Hydrology - The science that deals with the occurrence, circulation, distribution, and properties of water of the earth and the earth's atmosphere.

I.D. - inside diameter

Indurated - Describes a rock or soil hardened or consolidated by pressure, heat, or cementation.

Interglacial - Pertaining to or formed during the time interval between two successive glacial stages.

IRP - Installation Restoration Program

IWTP - industrial wastewater treatment plant

JP-4 - high octane aviation fuel

Kettle - A basin or bowl-shaped hole or depression, commonly without surface drainage, in glacial drift deposits formed by the melting of a large, detached block of ice (left behind by a retreating glacier) that had been wholly or partly buried in glacial drift.

Leachate - A solution resulting from the separation or dissolving or soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

Leaching - The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

MAC - Military Airlift Command

MAW - Military Airlift Wing

MCL - maximum contaminant limit

mg/l - milligrams per liter; a mass to liquid ratio that in freshwater is equal to parts per million (ppm)

ml - milliliters

ug/l - micrograms per liter; a mass to liquid ratio that in freshwater is equal to parts per billion (ppb)

MSL - mean sea level; recently changed to National Geodetic Vertical Datum (NGVD)

OEHL - Occupational and Environmental Health Laboratory (USAF) at Brooks AFB, Texas

OVA-128GC - Foxboro organic vapor analyzer Model 128 with gas chromatograph option

Organic - Being, containing, or relating to carbon compounds, especially in which hydrogen is attached to carbon.

Paleochannel - A remnant of a stream channel cut in older formations filled by the sediments of younger overlying formations; a buried stream channel.

PCB - polychlorinated biphenyl; a group of chlorinated phenolic compounds both highly toxic and persistent

perc - perchloroethylene; a commercial name for tetrachloroethylene

Permeability - The property or capacity of a porous rock, sediment, or soil for transmitting a fluid.

Pleistocene - The earlier of two epochs of the Quaternary period which began one to three million years ago and ended approximately 8,000 years ago. The most recent 8,000 years on the geologic time scale is known as the Holocene epoch.

POL - petroleum, oils and lubricants

Pollutant - Any gas, liquid or solid introduced into the environment that alters and contaminates it and makes it unfit for a particular use.

Porosity - The measure of the bulk volume of a rock or soil that is occupied by void spaces, whether isolated or connected.

Proglacial - Immediately in front of or just beyond the outer limits of a glacier or ice sheet.

PVC - polyvinyl chloride (a plastic)

QC - quality control

Quarternary Deposits - A system of rocks and strata deposited during the second period of the Cenozoic era. It began three million years ago and extends to the present.

RCRA - Resource Conservation and Recovery Act of 1976

RMCL - recommended maximum contaminant level

Recharge - The addition of water to the groundwater system by natural or artificial processes.

RPD - relative percent difference

SAIC - Science Applications International Corporation

SP - Self-potential; the natural time-variant electric field at the surface of the earth.

Sludge - Any inorganic or organic solids residues from a waste treatment plant, water supply treatment, or air pollution control facility; or other discarded material, including solid, liquid, semi-solid or solids which contain gaseous material resulting from industrial, commercial, mining or agricultural operations and community activities. Sludge does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

Spill - Any unplanned release or discharge of a hazardous waste onto or into the air, land or water.

Split-Spoon Sampler - A sampling device used in borehole drilling that is fastened to the lower end of the drill stem to extract an undisturbed soil/ rock sample. The sampler has a longitudinal seam which opens for sample retrieval.

SRCPP - solvent refined coal pilot plant

Static Water Level - The undisturbed water level measured in a well which represents the potentiometric surface for an aquifer. It is generally expressed as feet below (or above) an arbitrary measuring datum near land surface.

Strata - (plural of stratum) units or layers of sedimentary rock

Stratigraphic - pertaining to the science of rock strata

Subterranean - formed or occurring beneath the earth's surface

SWL - static water level

TCE - trichloroethylene

Thermistor - A temperature-sensing element composed of sintered semiconductor material which exhibits a large change in resistance proportional to a small change in temperature.

Toxic - The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

TPCHD - Tacoma-Pierce County Health Department.

Treatment of Hazardous Waste - Any method, technique, or process in including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

ULID - Utility Local Improvement District

Unconfined - When used with groundwater, it is that groundwater that has a free water table; i.e., water not confined under pressure beneath relatively impermeable rocks.

Upgradient - In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of groundwater.

USAF - United States Air Force

USGS - United States Geological Survey

Venturi Effect - The process by which a fluid flows through the shortened small-diameter center section of a specially machined tube at a higher velocity than through the end section thus creating a pressure differential.

VOC - volatile organic chemical

Water Table - The surface between the zone of saturation and the zone of aeration; that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

WDOE - Washington Department of Ecology

Well Casing - Metal or plastic pipe lowered into a borehole during or after drilling and grouted in place.

Well Screen - Metal or plastic well casing that is perforated to allow the passage of groundwater usually for the purposes of water production or for monitoring groundwater quality.

APPENDIX C

SCOPE OF WORK

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION (STAGE 1)
AMERICAN LAKE GARDENS, WASHINGTON *

I. DESCRIPTION OF WORK

The overall objective of the Phase II investigation is to define the magnitude, extent, direction and rate of movement of identified contaminants.

The purpose of this task is to undertake a field investigation at American Lake Gardens, WA (1) to investigate the possible contaminant source areas for identification of the specific source or sources of contamination; (2) determine the magnitude of contamination and the potential for migration of those contaminants in the various environmental media; and (3) determine the areal extent and vertical distribution of the contaminants in and around American Lake Gardens.

To accomplish this survey effort, the contractor shall take the following actions:

A. General

1. The contractor shall monitor all exploratory well drilling and borehole operations with a photo-ionization meter or equivalent organic vapor detection device to identify potential generation of hazardous and/or toxic materials. In addition, the contractor shall monitor drill cuttings for discoloration and odor. During drilling operations, if soil cuttings are suspected to be hazardous, the contractor shall place them in proper containers and test them for EP Toxicity and Ignitibility. Include the results of monitoring in boring logs. A maximum of six samples shall be collected for EP Toxicity and Ignitibility testing.

2. All water samples collected shall be analyzed on site by the contractor for pH, temperature, and specific conductance. Sampling, maximum holding time, and preservation of samples shall strictly comply with the following references: Standard Methods for the Examination of Water and Wastewater, 15th Ed. (1980), pp. 35-42; ASTM, Section 11, Water and Environmental Technology; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1983). All chemical analyses (water and soil) shall meet the required limits of detection for the applicable EPA method identified in Attachment 1.

3. All soil samples collected during these investigations shall be frozen and archived by the contractor for a period of one year.

4. Locations where sediment samples are taken, or where soil exploratory borings are drilled shall be marked with a permanent marker, and the location marked on a project map of the site.

* Highlights of modification underscored

5. Field data collected for each site shall be plotted and mapped. The nature, magnitude, and potential for contaminant flow within each zone to receiving streams and groundwaters shall be estimated. Upon completion of the sampling and anaysis, the data shall be tabulated in the next monthly R&D Status report as specified in Item VI below.

6. Determine the areal extent of the sites by reviewing available aerial photos of appropriate areas, both historical and the most recent panchromatic and infrared. Review aerial imagery over extended time frames to identify landform and landuse changes.

7. Split all water and soil samples as part of the contractor's interlaboratory Quality Assurance/Quality Control (QA/QC) protocols and procedures. One set of samples shall be analyzed by the contractor and the other set of samples shall be forwarded for analysis through overnight delivery to:

USAF OEHL/SA
Bldg 140
Brooks AFB TX 78235-5000

The samples sent to the USAF OEHL/SA shall be accompanied by the following information:

(a) Purpose of sample (analyte)

(b) Installation name (base)

(c) Sample number (on containers)

(d) Source/location of sample

(e) Contract Task Numbers and Title of Project

(f) Method of collection (bailer, suction pump, air-lift pump etc.)

(g) Volumes removed before sample taken

(h) Special Conditions (use of surrogate standard, special nonstandard preservations, etc.)

(i) Preservatives used

Forward this information with each sample by properly completing an AF Form 2752 (copy of form and instruction on proper completion mailed under separate cover). In addition, copies of field logs documenting sample collection should accompany the samples.

Maintain chain-of-custody records for all samples, field blanks, and quality control duplicates.

8. Analyze an additional 10% of all samples, for each

parameter, for quality control purposes, as indicated in Attachment 1. Include all quality control data in draft and final reports.

9. For ground water monitoring wells, comply with the U.S. EPA Public 330/9-S1-002, NEIC Manual for Ground Water/Subsurface Investigators at Hazardous Waste Sites or State of Washington requirements for monitoring well installation, whichever are more stringent. Use only screw type joints.

10. Wells shall be of sufficient depth to collect samples representative of aquifer quality and to intercept contaminants if they are present. Well development shall proceed until the discharge water is clear and free of sediment to the fullest extent possible.

11. Survey elevations of all newly installed monitoring wells with respect to a USGS bench mark on base to an accuracy of 0.01 feet. Horizontally locate the new wells to an accuracy of 1 foot and record on site maps.

12. Measure water levels at all monitoring wells as feet below the ground surface or below the top of casing elevation to the nearest 0.01 feet. Report in terms of mean sea level. Measure static water levels in wells prior to sampling and at time of well development.

13. The exact location and number of monitor wells, piezometers, soil gas and geophysical investigations for each site shall be determined in the field by the contractor in consultation with the Air Force project manager. The approximate locations and recommended number and depth of wells and piezometers (including screening lengths), plus approximate locations for soil gas and geophysical investigations for sites under investigation are given in the site specific section of the task.

14. Exact locations of all wells shall be determined in the field such that McChord AFB-American Lake Gardens-Ft Lewis Military Reservation are considered as one system to determine the source(s) of contamination. Coordinate well locations around the Ft Lewis area with the Ft Lewis point of contact listed in section V, to eliminate duplication of effort. Drill all monitor wells/piezometers using the following specifications:

a. Drill all shallow piezometers and monitoring wells using 3-3/8-inch hollow stem auger techniques. Drilling depth shall be approximately 60 feet, but not penetrate through the bottom of the glacial till unit formation. Take samples for stratigraphic control purposes at 5-foot intervals. Include pilot boring log and well completion summaries in the Final Report (as specified in Item VI below). A maximum of 20 shallow wells/piezometers shall be drilled. Total footage of shallow wells/piezometers shall not exceed 900 linear feet. Construct each well with two-inch, Schedule 40 PVC casing using threaded, non-glued fittings. Total screening shall not exceed 600 feet. The screen shall consist of two-inch, Schedule 40 PVC with a slot size of 0.010 inches. All connections shall be flush-joint threaded. Standard penetration rates shall be determined in conjunction with split spoon sampling. Soil from the split spoon

shall be logged by the field geologist and containerized in clean 16-ounce glass jars and archived. The screen zone shall be determined based on organic vapor analysis (OVA) of borehole cuttings collected at 5-foot intervals using a 2-inch split spoon sampler. If the OVA analyses suggest chemical presence within but not above the glacial till unit formation, the screen shall be placed within but not extend above the till unit, and a bentonite seal and cement plug shall be placed to restore separation between the upper aquifer and water bearing seams within the till formation. Wells to be screened in the recessional outwash above the glacial till formation shall, if so determined by the field geologist, have the borehole that extends into the till formation packed with bentonite; and/or a blank piece of PVC pipe with end plug shall be placed below the screen zone to reduce infiltration and settling of glacial till fines in the bottom of the well casing.

b. Well Completion of Shallow Wells: Gravel-pack each well with washed and bagged rounded sand or gravel with a grain size distribution compatible with the screen and formation. Place the pack from the bottom of the borehole to 2 feet above the top of the screen. A 5-foot or greater bentonite seal shall be placed in the glacial till unit to restore the aquitard and separation properties of the formation. A 2-foot cement plug shall be placed on top of the bentonite seal. Bentonite or a bentonite and sand mixture shall be placed in the annular space to a depth not less than 10 feet from the ground surface. A bentonite and cement plug shall be poured to ground level. The surface seal shall extend to a minimum depth of 18 feet, unless the groundwater level necessitates less footage. Complete each well with installation of a cap, and clearly number with exterior paint. A protective steel monument with hinged lid and lock hasp shall be placed around the PVC well casing and anchored in the concrete. A 1/2-inch hole shall be drilled through the monument wall to allow drainage of water between the well casing and monument.

15. Develop each well with a submersible pump or airlift method until such time as the water clears and water quality as measured by pH, specific conductance or turbidity achieves stability (± 0.1 pH unit, ± 5 umhos, or ± 2 JTU).

16. Purge wells prior to sampling. Purging will be complete when three well volumes of water have been displaced or until the pH, specific conductance, or turbidity achieves stability (± 0.1 pH unit, ± 5 umhos, or ± 2 JTU). Conduct purging operations using a submersible pump or airlift method. Conduct all sampling using a Teflon bailer or gas-driven sampler. As the first step of groundwater sampling operations at each well, take water level measurements to the nearest 0.01 foot with respect to an established surveyed mark-point on top of the well casing.

17. Second-column confirmation shall be required when detection limits of analyzed samples exceed values identified in Attachment 1. If the values in Attachment 1 are exceeded, results of these analyses shall be reported immediately (by phone, then overnight express mail) to USAF OEHL. It is estimated that 50% of the samples collected for EPA Methods 601 and 602 analyses will require

second-column confirmation. Total number of samples for Methods 601 and 602 in Attachment 1 include these confirmation analyses. Report all procedures and conditions used.

18. Conduct a literature search for local hydrogeologic conditions.

19. All well drilling, development, purging, and sampling methods must conform to State requirements. Include in the Appendix the names of all approving State regulatory personnel and dates that they accepted drilling techniques, well development, purging, and sampling methods.

20. Summarize sampling methods used, detection levels, and holding times in a table included in the Appendix.

21. Include second column confirmation results in the report. These shall include what columns were used, conditions, and the two different retention times for major components.

22. Include internal quality control data (lab blanks, lab spikes, and lab duplicates) in the report, as well as field quality control data.

23. Include in the report an inventory of all wells in, and immediately adjacent to, American Lake Gardens (active and abandoned).

B. In addition to items delineated in A above, conduct the following specific actions in and adjacent to American Lake Gardens:

1. Records Search: Conduct a records search for American Lake Gardens to determine the historical land use, known or suspected industrial or commercial activities, or other events including spills, dumps or accidents which may have contributed to a groundwater contamination problem. Review U.S. EPA records and HRS ranking files. Additionally, review records at the Tacoma-Pierce County Health Department, Washington State Department of Ecology and the Department of Social and Health Services. Collect and review all available private well logs. Conduct personal interviews with local commercial operators, known long-time residents, and local and state health and regulatory agencies. Examine the IRP Phase I record search reports for both McChord AFB and Fort Lewis. In addition, examine all results of current Phase II studies at both McChord AFB and Ft Lewis.

2. Soil Gas Analysis: Perform soil gas investigations using field equipment designed to draw soil air into a portable gas chromatograph. Take soil gas measurements at 10-foot soil depths and at a grid spacing of not less than 25 feet. Following the completion of all soil gas surveys and the Records Search activities, forward an interim summary report to USAF OEHL detailing all findings, conclusions and recommendations including finalization of the geophysical survey transects and locations of groundwater monitoring wells. Tentative locations of the soil gas investigations include:

a. One spatial grid located west of McChord Base Housing

Gate. Grid dimensions are 300 ft x 500 ft. Suspected sources include a surface pond and past disposal area.

b. One spatial grid located south of McChord Base Housing Gate. Grid size is 300 ft x 500 ft. Suspected source includes a past disposal area near the existing gate house used for disposal of unknown wastes.

3. Geophysical Interpretations: Perform a series of geophysical investigations to assist in determination of the spatial extent and depth below grade to the top of the glacial till unit formation, to identify and characterize where possible subsurface anomalies detected by earth resistivity, and finally to help identify groundwater movement. The geophysical study shall include:

a. A review of the existing geophysical data to better design the new program.

b. The collection, reduction and analysis of the self potential (SP), resistivity and seismic refraction data. The data set shall include:

(1) Self Potential - 58,000 lineal feet sampled at 25-foot intervals.

(2) Resistivity - 40 Schlumberger soundings at spacings of approximately 200 feet.

(3) Seismic Refraction - 24,400 lineal feet with geophone spacings of approximately 20 feet.

c. Compilation of the new geophysical data and integration with the existing geologic and geohydrologic data.

4. Monitoring Well Placement and Sampling: Review soil gas survey results to determine the presence and most probable distribution of volatile organic contaminants in the soil or groundwater. Soil gas data, together with record search findings and interpretations, plus geophysical data and conclusions shall be analyzed collectively and used to site the locations of soil borings and the placement of wells.

a. Install a maximum of 20 shallow groundwater monitoring and observation wells. The final locations for the wells in the American Lake Garden Tract, McChord AFB and/or Ft Lewis Military Reservation areas shall be determined following completion of the records search, soil gas survey and interpretation of all geophysical investigations.

b. Collect a total of 143 groundwater samples from newly constructed and existing U.S. EPA and USAF monitoring wells. Depth of the sample and time of collection shall be noted. Depth to the groundwater table shall be taken immediately prior to sample collection. Tentative sample collection shall be as follows:

(1) Collect 5 discrete samples from each of the 20 new wells (100 total samples).

(2) Collect 3 discrete samples from each of the 3 existing USAF wells (9 total samples).

(3) Collect 2 discrete samples from each of the 17 existing U.S. EPA wells (34 total samples).

c. Analyze all groundwater samples for 36 U.S. EPA Priority Volatile Organic Pollutants (VOAs) using gas chromatography (GC) technology in accordance with EPA Methods 601 and 602.

C. Well/Piezometer Cleanup

Remove all well and piezometer area drill cuttings and clear the general area following the completion of each well and boring. Only those drill cuttings suspected as being a hazardous waste (based on discoloration, odor, or organic vapor detection instrument) shall be properly containerized (according to McChord AFB civil engineering office requirements) by the contractor for eventual government disposal. The suspected hazardous waste shall be tested by the contractor for EP Toxicity and Ignitibility. The contractor is not responsible for ultimate disposal of the drill cuttings. Disposal will be conducted by McChord AFB personnel.

D. Data Review

Results of sampling and analysis shall be tabulated and incorporated in the Informal Technical Information Report (as specified in Item VI below) and forwarded to the USAF OEHL for review. Results shall also be forwarded as they become available in the next monthly R&D status report.

E. Reporting

1. A draft report delineating all findings of this field investigation shall be prepared and forwarded to the USAF OEHL (as specified in item VI below) for Air Force review and comment. This report shall include a discussion of the regional hydrogeology, well and boring logs, data from water level surveys and geophysical surveys and maps and interpretation of the data generated, aquitest results and conclusions, water quality analysis results, available geohydrologic cross sections, groundwater surface and gradient vector maps, vertical and horizontal flow vectors, laboratory quality assurance information, magnitude and extent and direction of movement of environmental contamination, significance of discovered contamination, and actions thought to be necessary to comply with state and federal regulations. Specific recommendations for future groundwater and surface water monitoring must be identified. The report shall follow the USAF OEHL supplied format (mailed under separate cover).

2. The contractor shall utilize active field results produced by the Ft Lewis corresponding work in the data reduction, reporting

and recommendations.

F. Meetings

The contractor's project leader shall attend six meetings with Air Force headquarters and regulatory agency personnel to take place at times to be specified by the USAF OEHL. The meetings shall take place at McChord AFB for a duration of one day each (total of 48 man-hours).

II. SITE LOCATION AND DATES:

American Lake Gardens, WA
Date to be established

III. BASE SUPPORT:

McChord AFB will provide the following support:

1. McChord AFB shall provide access to all sites. This may necessitate the clearance of small areas to permit set up and operation of drilling rigs and equipment.

2. McChord AFB shall provide water from hydrant or other supply source for drilling contractor water tank refill.

3. McChord AFB shall provide traffic control where/when necessary during geophysical surveys or well construction on or adjacent to road rights-of-way.

4. McChord AFB shall be prepared to close the West Gate for a period of up to 50 hours prior to and during the drawdown pump test of any 6-inch well constructed on Air Force property south of Lincoln Boulevard and adjacent to American Lake Gardens. This closure is necessary to allow on-grade transfer of pump discharge water to the swamp north of the gatehouse. The contractor shall coordinate this pump test activity with USAF Security and Base Command so as to select a time period least disruptive to base operations.

5. McChord AFB shall continue to make available to the contractor electrical power (230V) currently supplied to breaker boxes and pump control boxes at USAF Wells DR01 through DR05.

6. McChord AFB shall ensure rights of easement and any other required licenses are obtained across private properties so as to perform soil gas analysis, nondestructive geophysical explorations, the boring and construction of one or more monitoring wells, and other investigations that may be required in performance of this investigation.

IV. GOVERNMENT FURNISHED PROPERTY: None

V. GOVERNMENT POINTS OF CONTACT:

1. Maj Dennis D. Brownley
USAF OEHL/TSS
Brooks AFB TX 78235
(512) 536-2158
AV 240-2158

2. Capt Dulcie Weisman
USAF Clinic McChord/SGPB
McChord AFB WA 98438-5300
(206) 984-3921
AV 976-3921

3. Lt Col Edwin C. Banner III
HQ MAC/SGPB
Scott AFB IL 62225-5000
(618) 256-2306
AV 638-2306

4. Mr. Stephen Miller
DEH, Environmental Office
Ft Lewis, WA 98433-5000
(206) 967-4076
AV 357-4076

VI. In addition to sequence numbers 1*, 5, and 11 in Attachment 1 to the contract, which are applicable to all orders, the sequence numbers listed below are applicable to this order. Also shown are data applicable to this order.

* Forward a copy of the R&D Status Report to all government POC's identified in Section V.

Sequence No.	Block 10	Block 11	Block 12	Block 13	Block 14
3	O/Time	*	*		
4	One/R	19 AUG 85	2 SEP 85	29 NOV 85	**

* Upon completion of analytical effort before submission of 1st draft report.

** Two draft reports will be required. After incorporating Air Force comments concerning the first draft report, the contractor shall supply the USAF OEHL with one copy of the second draft report. Upon acceptance of the second draft, the USAF OEHL will furnish a distribution list for the remaining 24 copies of the second draft. The contractor shall supply 50 copies plus the original camera ready copy of the final report.

Analytical Methods, Detection Limits, and Number of Samples

PARAMETER	METHOD	DETECTION LIMIT	NO. OF SAMPLES	QA	TOTAL SAMPLES
Volatile Organic Compounds	EPA 601 and 602	a	143 water	15 water	237 water[b]
EP Toxicity	40 CFR 261.24	c	5	1	6
Ignitibility	40 CFR 261.24	d	5	1	6

a Detection limits for Volatile Organic Compounds shall be as specified for the compounds by EPA Methods 601-602. Methods 601 and 602 for volatile organics require positive confirmation by a second gas chromatographic column. This must be done before reporting positive values. Methods 601 and 602 specify the two columns to use. Second column confirmation is required when values exceed:

Benzene	0.7 ug/l
Carbon Tetrachloride	4.0 ug/l
1,2 Dichloroethane	0.1 ug/l
Methylene Chloride	4.0 ug/l
Tetrachloroethylene	4.0 ug/l
Trichloroethylene	1.0 ug/l
Vinyl Chloride	1.0 ug/l
Dichlorobenzene isomers	Sum greater than 10 ug/l
Any other organics	Greater than 10 ug/l

Retention times on both columns must match before reporting positive value. If no match, it will be considered an interference.

If questions are encountered about certain contaminants, the contractor may be asked to show both chromatograms used to rule out possible interferences.

b Total of 237 includes second column confirmation for 50% of the samples (79).

c

Metal	ug/L of leaching solution
As	10
Ba	200
Cd	10
Cr	50
Pb	20
Hg	1
Se	10
Ag	10

d Find if sample is ignitible at 140 degrees Farenheit or below. If so it is a hazardous waste.

APPENDIX D

BORING LOGS AND WELL CONSTRUCTION SUMMARIES

Table D-1

GUIDELINES FOR CLASSIFICATION OF SOILS

Cohesionless (Sands & Gravels)

N-Blows/ft[a]	Relative Density
0-4	Very Loose
4-10	Loose
10-30	Medium
30-50	Dense
50	Very Dense

Cohesive (Silts & Clays)

N-Blows/ft[a]	Relative Consistency
2	Very Soft
2-4	Soft
4-8	Medium
8-15	Stiff
15-30	Very Stiff
30	Hard

Grain Size Classification[b]

Inches	mm	Grade Name		
161.3	4096			
		Very Large	Boulders	GRAVEL
80.6	2048			
		Large		
40.3	1024			
		Medium		
20.2	512			
		Small		
10.1	256			
		Large	Cobbles	
5.0	128			
		Small		
2.52	64			
		Very Coarse	Pebbles	
1.26	32			
		Coarse		
0.63	16			
		Medium		
0.32	8			
		Fine		
0.16	4			
		Very Fine		
0.08	2			
		Very Coarse	Sand	SAND
0.04	1			
		Coarse		
	0.500			
		Medium		
	0.250			
		Fine		
	0.125			
		Very Fine		
	0.062			
		Coarse	Silt	MUD
	0.031			
		Medium		
	0.016			
		Fine		
	0.008			
		Very Fine		
	0.004			
		Coarse	Clay Size	
	0.002			
		Medium		
	0.001			
		Fine		
	0.0005			
		Very Fine		
	0.00025			

Modifier for Subclassification

0-1.5%[c]	Clean
1.5-10%	Trace
10-30%	Some
30-50%	Sandy,
30-50%	Silty, or Clayey

[a] Blows per foot standard penetration test.

[b] Modified Wentworth Scale--in Dietrich, et al., 1982.

[c] Percentage of dry weight of total sample.

WELL_ID	CSG_ELEV	CSG_DIA	INST_DATE	BORE_DEPTH	WELL_DEPTH	SCR_DEPTH
AZ07_A	283.96	2	05/10/85	68	68	48-68
AZ08_A	281.24	2	05/14/85	43	43	33-43
AZ09_A	282.12	2	05/15/85	63	63	23-33
DZ08_A	273.91	2	05/08/85	32	32	12-32
DZ09_A	276.94	2	05/09/85	63	58	8-18
DZ09_B	276.94	2	05/09/85	63	58	48-58
DZ10_A	269.65	2	05/13/85	68	68	8-18
DZ10_B	269.65	2	05/13/85	68	68	58-68
DZ11_A	280.32	2	05/16/85	43	43	23-43
DZ12_A	279.47	2	05/17/85	78	78	68-78
DZ13_A	279.46	2	05/20/85	28	28	18-28
DZ14_A	283.99	2	06/17/85	68	68	58-68
LZ01_A	272.21	2	06/26/85	48	48	38-48
LZ02_A	271.12	2	06/27/85	28	28	18-28
LZ03_A	279.06	2	06/28/85	63	49	29-49
LZ04_A	279.98	2	07/01/85	63	63	53-63
TZ01_A	276.45	2	06/10/85	73	73	58-73
TZ02_A	268.29	2	06/11/85	68	62	52-62
TZ03_A	276.97	2	06/12/85	63	63	53-63
TZ04_A	277.35	2	06/13/85	33	33	23-33
TZ05_A	268.20	2	06/13/85	43	43	33-43
TZ06_A	272.04	2	06/14/85	68	68	53-68
TZ07_A	262.05	2	06/18/85	48	48	38-48
TZ08_A	281.76	2	07/02/85	43	43	33-43
TZ09_A	258.80	2	07/02/85	43	43	33-43
TZ10_A	256.02	2	07/03/85	53	53	43-53
TZ11_A	272.78	2	07/14/85	44	38	28-38
TZ12_A	272.78	2	07/14/85	58	58	48-58

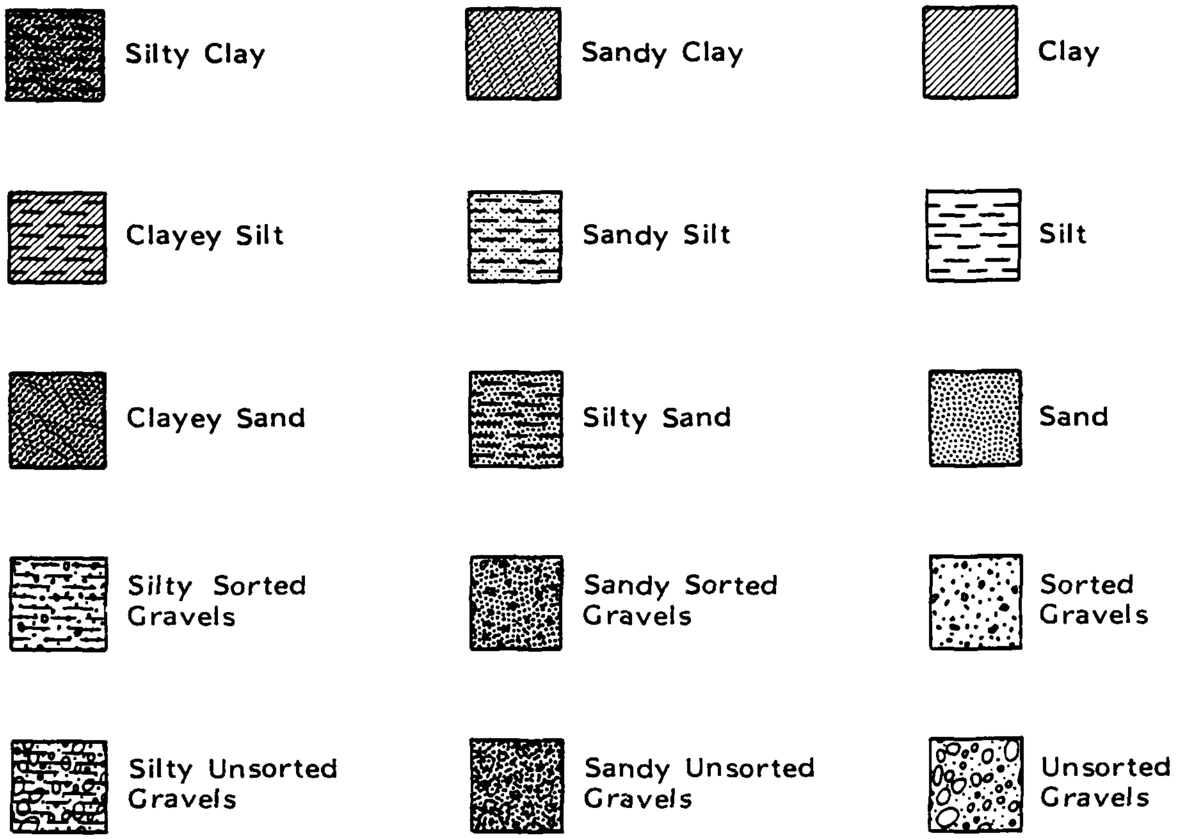


Figure D-1

GEOLOGIC SYMBOLS FOR UNCONSOLIDATED MATERIALS

SAIC WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: AZ07

DRILLING SUMMARY

Total Depth: 68'

Borehole Diameter: 9"

ELEVATION

Land Surface: 280.9

Top of Casing: 283.86

Groundwater: 258.18 (26 Jul 85)

Drilling Started: 10 May 1985 (date) 0745 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 10 May 1985 (date) 1015 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-48'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 48-68'

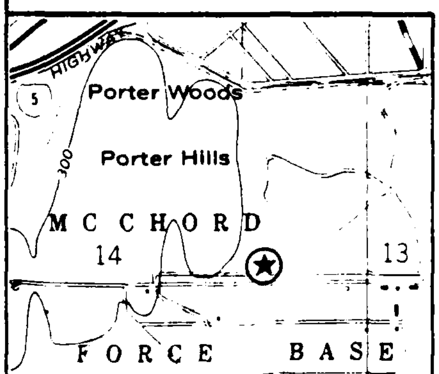
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: North of Igloo 816, outside boundary fence of McChord AFB ammo dump.

Latitude:

Longitude:

Twp: 19N Rge: 2E Sec: NE¼ SE¼ 14

— BORING LOG —

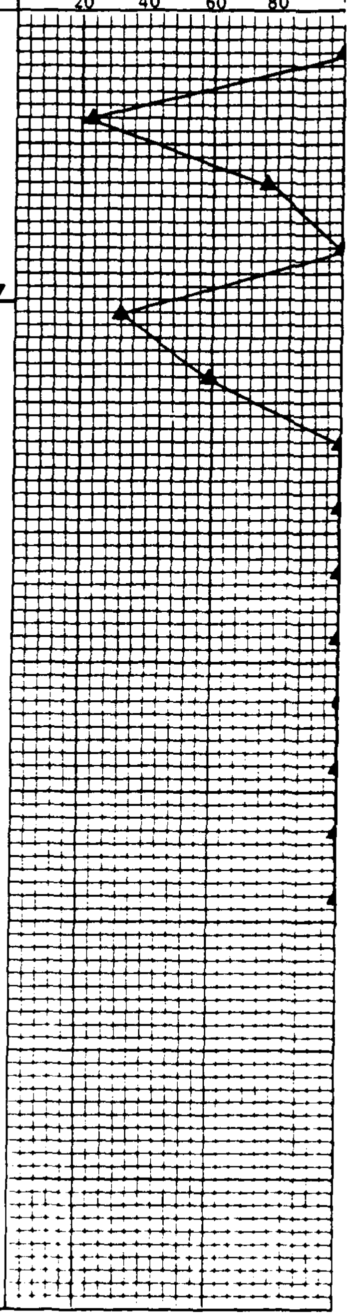
PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: A207 **DATE:** 10 May 1985

SURFACE ELEVATION: 280.9 **GROUNDWATER ELEVATION:** 258.18 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-1 Organic mantle		Grout
		1-50 Medium to oarse sand, some fine, very gravelly, silty, poorly sorted, unconsolidated, brownish black to dark yellowish brown.		
270.94	10			
260.94	20			Bentonite
250.94	30	30-39 As above, increasing fine sand.		
240.94	40			
230.94	50	50-58 Very coarse sand, some fine, gravelly, some silt, unsorted, unconsolidated black to olive gray.		Sand Pack
		58-68 Fine sand, trace gravel decreasing with depth, trace silt, increased sorting with depth, unconsolidated, black to grayish yellow.		
220.94	60			
		68' Total Depth		
210.94	70			

STANDARD PENETRATION RESISTANCE



WELL CONSTRUCTION SUMMARY

SAIC

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** AZ08

DRILLING SUMMARY

Total Depth: 43'

Borehole Diameter: 9"

ELEVATION

Land Surface: 278.5

Top of Casing: 281.24

Groundwater: 259.02 (26 Jul 85)

Drilling Started: 14 May 1985 (date) 0845 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 14 May 1985 (date) 1035 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-33'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 33-43'

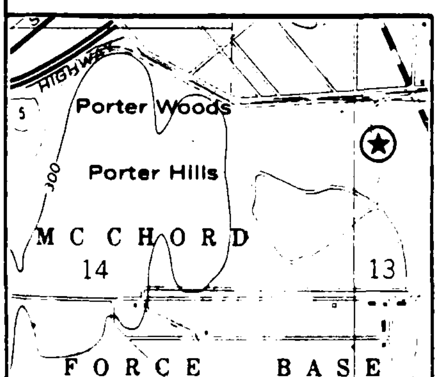
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 300 feet SW of intersection of McChord Drive and Bridgeport Way on USAF property.

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** W½ NW¼ 13

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: AZ08

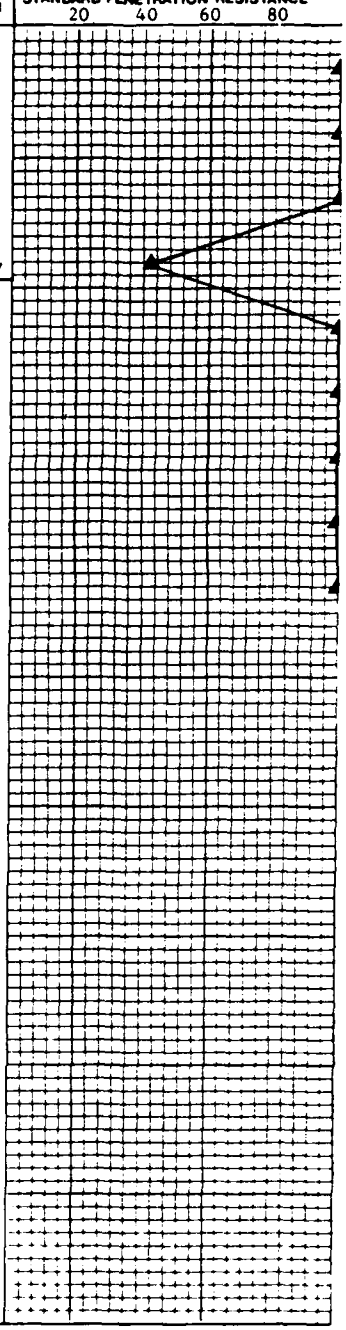
DATE: 14 May 1985

SURFACE ELEVATION: 278.5

GROUNDWATER ELEVATION: 259.02 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	GROUND WATER
		0-4 Organic mantle/flyash fill, black, unconsolidated.	Grout
		4-10 Fine to medium sand, some coarse sand, trace gravel increasing to very gravelly with depth, sorted to unsorted, unconsolidated, olive gray to yellowish brown.	
268.49	10	10-36 Medium to very coarse sandy gravel, grading to gravelly sand, medium to very coarse, some fine, some silt, unsorted unconsolidated, brownish black to dark yellowish brown.	Bentonite
258.49	20		
248.49	30		
		36-43 Sand, fine, some medium, some very fine to silt, some sorting, unconsolidated black to light olive gray.	Sand Pack
238.49	40	43' Total Depth	
228.49	50		

STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: AZ09

DRILLING SUMMARY

Total Depth: 63'

Borehole Diameter: 9"

ELEVATION

Land Surface: 278.7

Top of Casing: 282.12

Groundwater: 258.91 (26 Jul 85)

Drilling Started: 14 May 1985 (date) 1505 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 15 May 1985 (date) 1300 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-23', 33-53'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 23-33', 53-63'

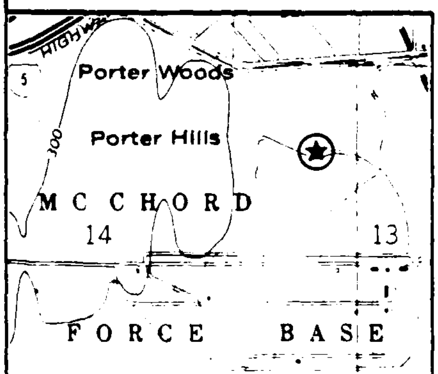
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES: Two separate screen zones in single string of casing.

SITE DESCRIPTION



Site Sketch

Location: North of ammo dump, S of Milburn Pond on north fork of loop road through training area on McChord AFB.

Latitude:

Longitude:

Twp: 19N Rge: 2E Sec: E½ NE¼ 14

SAIC Science Applications International Corporation

BORING LOG

PROJECT:	American Lake Garden Tract IRP Phase II, Stage I	**LOCATION:**	Tacoma, Washington
WELL ID:	AZ09	**DATE:**	14-15 May 1985
SURFACE ELEVATION:	278.7	**GROUNDWATER ELEVATION:**	258.91 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-1 Organic mantle 1-56 Very gravelly sandy loam grading to gravelly sand, coarse to medium, silty, poorly sorted, unconsolidated, brownish black to yellowish brown		Grout	
268.70	10				Bentonite	
258.70	20				Sand Pack	
248.70	30		30-35 As above, very silty, dense, consolidated, grayish olive green		Native Backfill	
238.70	40					
228.70	50					
218.70	60		56-63 Sand, fine to medium, trace gravel, well sorted, unconsolidated black to grayish yellow 63' Total Depth		Sand Pack	
208.70	70					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** DZ08

DRILLING SUMMARY

Total Depth: 32'

Borehole Diameter: 9"

ELEVATION

- **Land Surface:** 271.5
- **Top of Casing:** 273.91
- **Groundwater:** 257.80 (26 Jul 85)

Drilling Started: 8 May 1985 (date) 0945 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 8 May 1985 (date) 1115 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 0-12'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 12-32'

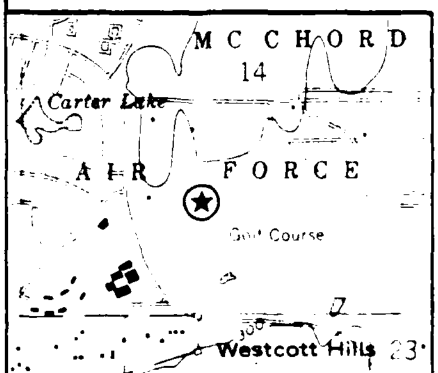
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: East side of Fairway 3 on McChord AFB golf course.

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SW¼ 14

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract
IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: DZ08

DATE: 8 May 1985

SURFACE ELEVATION: 271.5

GROUNDWATER ELEVATION: 257.80 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-2 Organic mantle 2-26 Very gravelly coarse to medium sand, some silt, poorly sorted, unconsolidated brownish black to brown.		Grout
261.49	10			
251.49	20			Sand Pack
241.49	30	26-32 Sandy clayey silt, trace gravel, poorly sorted, well consolidated, dense, gray to olive gray. *32' Total Depth*		
231.49	40			

STANDARD PENETRATION RESISTANCE
20 40 60 80

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** DZ09

DRILLING SUMMARY

Total Depth: 63"

Borehole Diameter: 9"

ELEVATION

- **Land Surface:** 273.9
- **Top of Casing:** 276.94
- **Groundwater:** 258.93 (26 Jul 85)

Drilling Started: 9 May 1985 (date) 0915 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 9 May 1985 (date) 1320 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 0-13', 23-53'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 13-23', 53-63'

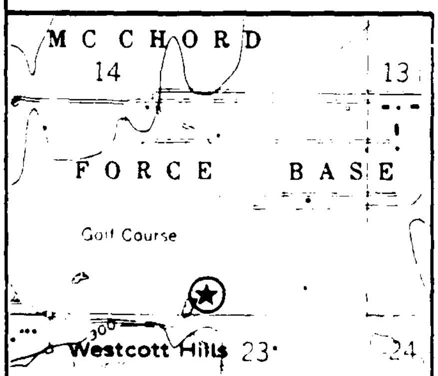
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES: Two separate screen zones in single string of casing.

SITE DESCRIPTION



Site Sketch

Location: Approximately 200 feet northeast of dike at north end of duck pond on McChord AFB golf course.

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** S$\frac{1}{2}$ SE$\frac{1}{4}$ 14

SAIC Science Applications International Corporation

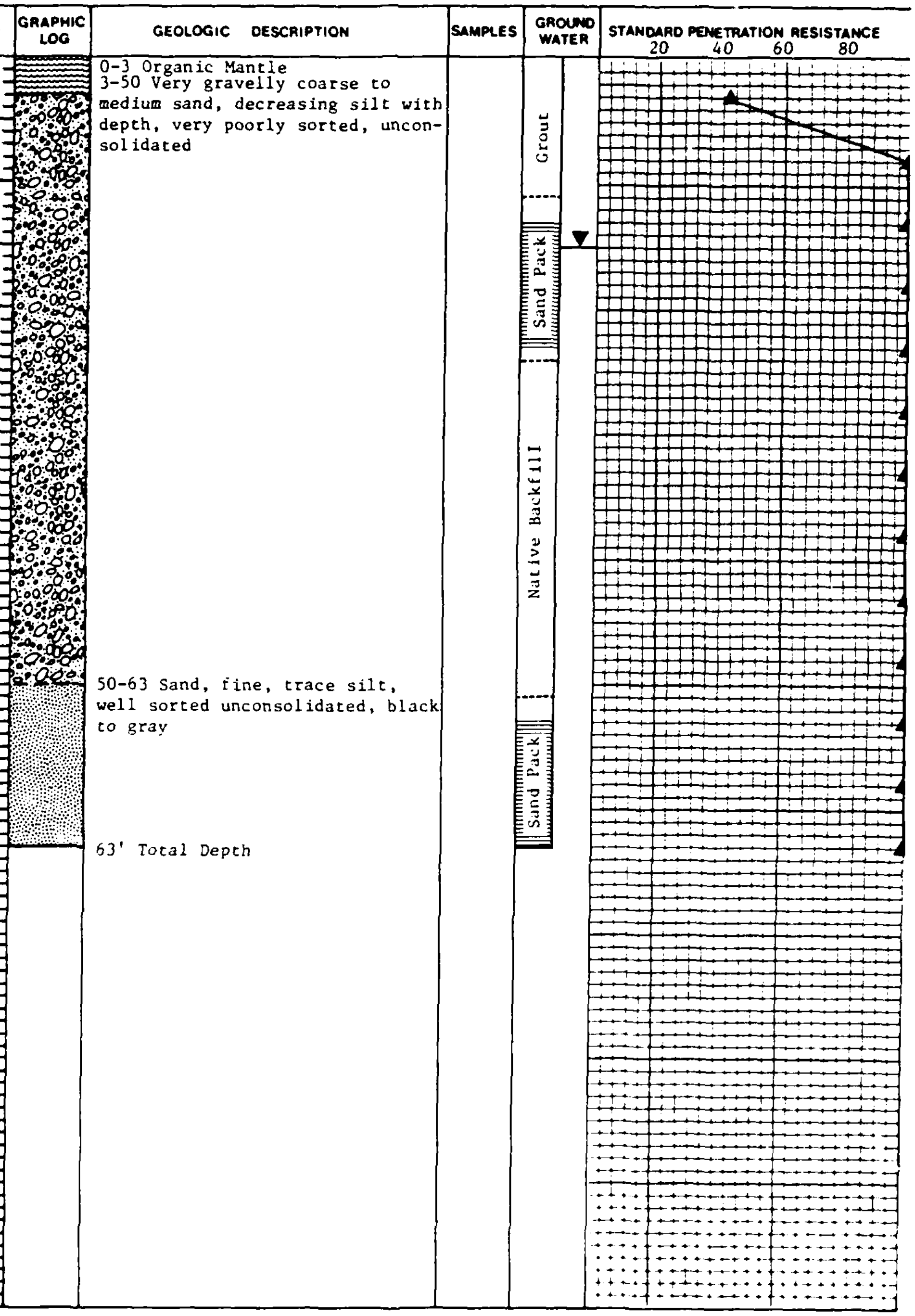
BORING LOG

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: DZ09 **DATE:** 9 May 1985

SURFACE ELEVATION: 273.9 **GROUNDWATER ELEVATION:** 258.93 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION
	0	0-3 Organic Mantle 3-50 Very gravelly coarse to medium sand, decreasing silt with depth, very poorly sorted, unconsolidated
263.94	10	
253.94	20	
243.94	30	
233.94	40	
223.94	50	50-63 Sand, fine, trace silt, well sorted unconsolidated, black to gray
213.94	60	63' Total Depth
203.94	70	



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: DZ10

DRILLING SUMMARY

Total Depth: 68'

Borehole Diameter: 9"

ELEVATION

Land Surface: 267.1

Top of Casing: 269.65

Groundwater: 258.01 (26 Jul 85)

Drilling Started: 10 May 1985 (date) 1500 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 13 May 1985 (date) 1330 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-8', 18-58'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 8-18', 58-68'

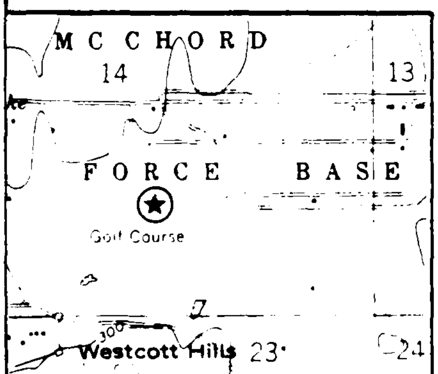
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES: Two separate screen zones in single string of casing.

SITE DESCRIPTION



Site Sketch

Location: In swampy depression east of Fairway 4 at McChord AFB golf course.

Latitude:

Longitude:

Twp: 19N

Rge: 2E

Sec: E½ SW¼ 14

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract
IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: DZ10

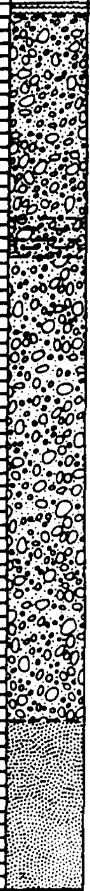
DATE: 10-13 May 1985

SURFACE ELEVATION: 267.1

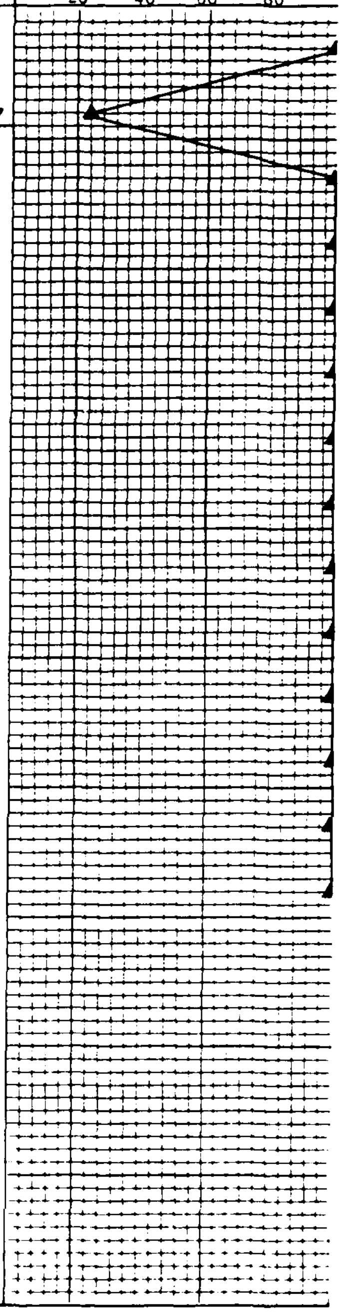
GROUNDWATER ELEVATION: 258.01 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-1 Organic mantle 1-55 Very gravelly very coarse to medium sand, some silt, unsorted, unconsolidated, greenish gray to brownish black.		Grout
257.07	10			Sand Pack
247.07	20	18 Coarse sandy silt, some gravel unsorted, well consolidated, olive gray.		Native Backfill
237.07	30			
227.07	40			
217.07	50			
207.07	60	55-68 Sand, fine, some medium, trace gravel, well sorted, unconsolidated, olive gray to black, grading to very silty fine sand.		Sand Pack
197.07	70	68' Total Depth		

GRAPHIC LOG



STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: DZ11

DRILLING SUMMARY

Total Depth: 43'

Borehole Diameter: 9"

ELEVATION

Land Surface: 277.7

Top of Casing: 280.32

Groundwater: 258.13 (26 Jul 85)

Drilling Started: 16 May 1985 (date) 0920 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 16 May 1985 (date) 1500 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-23'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 23-43'

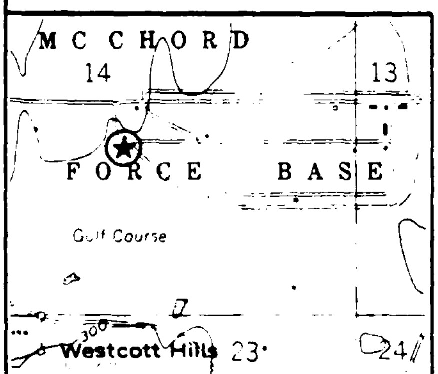
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: West of perimeter road outside west boundary fence of McChord AFB ammo dump.

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: W½ NW¼ 14

SAIC Science Applications International Corporation

— BORING LOG —

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: DZ11 **DATE:** 16 May 1985

SURFACE ELEVATION: 277.7 **GROUNDWATER ELEVATION:** 258.13 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-1 Organic mantle. 1-41 Very coarse to medium sandy gravel, some silt, unsorted, unconsolidated, olive gray to brownish black.		Grout	
267.74	10				Bentonite	
257.74	20		23 Coarse sandy silt, some gravel, unsorted well consolidated, olive gray.			
247.74	30				Sand Pack	
237.74	40		41-43 Sand, fine to very fine, silty, well sorted, unconsolidated, grayish olive green. 43' Total Depth			
227.74	50					

SAIC WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: DZ12

DRILLING SUMMARY

Total Depth: 78'

Borehole Diameter: 9"

ELEVATION

Land Surface: 277.3

Top of Casing: 279.47

Groundwater: 255.18 (26 Jul 85)

Drilling Started: 17 May 1985 (date) 1120 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 17 May 1985 (date) 1630 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-68'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 68-78'

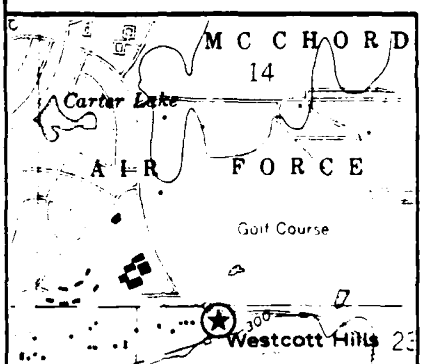
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES: Original PVC casing broke as augers were being withdrawn from the hole. 50 feet of casing was salvaged and the remainder was drilled out as the borehole was redrilled to 78 feet. New PVC casing was set at 78 feet.

SITE DESCRIPTION



Site Sketch

Location: Approximately 100 feet southwest of McChord AFB housing gate guard shack.

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: N½ NW¼ 23

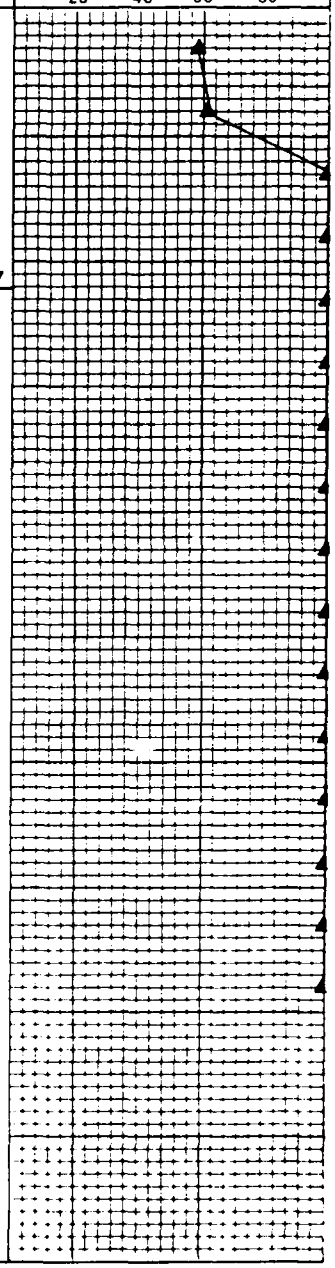
SAIC Science Applications International Corporation

— BORING LOG —

PROJECT:	American Lake Garden Tract IRP Phase II, Stage 1	**LOCATION:**	Tacoma, Washington
WELL ID:	DZ12	**DATE:**	17 May 1985
SURFACE ELEVATION:	277.3	**GROUNDWATER ELEVATION:**	255.18 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	GROUND WATER
		0-2 Organic mantle 2-26 Coarse sandy gravel, some silt, unsorted, unconsolidated, olive gray to olive brown.	Grout
267.30	10		Bentonite
257.30	20		
247.30	30	26-62 Very sandy gravelly silt, some clay, unsorted, well consolidated to unconsolidated, pale olive to olive black.	
237.30	40		
227.30	50		
217.30	60	62-78 Sand, fine to very fine, some silt, well sorted, unconsolidated, olive gray to olive black	
207.30	70		Sand Pack
197.30	80	78' Total Depth	

STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: DZ13

DRILLING SUMMARY

Total Depth: 28'

Borehole Diameter: 9"

ELEVATION

Land Surface: 277.3

Top of Casing: 279.46

Groundwater: 257.11 (26 Jul 85)

Drilling Started: 20 May 1985 (date) 1500 (time)

Geologist: Robert L. Peshkin

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Paddle Tooth

Drilling Fluid: None

Drilling Completed: 20 May 1985 (date) 1600 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-18'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 18-28'

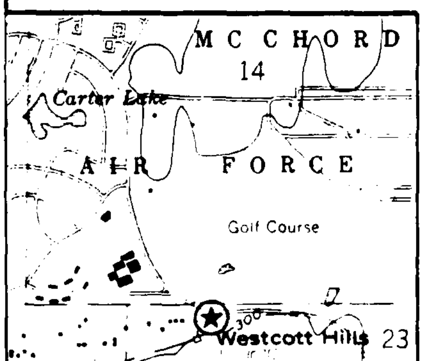
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES: Steel tip of drill rods is at the bottom of the borehole beneath the PVC casing.

SITE DESCRIPTION



Site Sketch

Location: Approximately 100 feet southwest of the McChord AFB housing gate guard shack.

Latitude:

Longitude:

Twp: 19N

Rge: 2E

Sec: N½ NW¼ 23

SAIC Science Applications International Corporation

—— BORING LOG ——

PROJECT: American Lake Garden Tract
IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: DZ13

DATE: 20 May 1985

SURFACE ELEVATION: 277.3

GROUNDWATER ELEVATION: 257.11 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-2 Organic mantle. 2-26 Coarse sandy gravel, some silt, unsorted, unconsolidated, olive gray to olive brown.		Grout	
267.29	10				Bentonite	
257.29	20				Sand Pack	
			26-28 Sandy gravelly silt, unsorted, well consolidated, pale olive to olive black.			
247.29	30		28' Total Depth			

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: DZ14

DRILLING SUMMARY

Total Depth: 68'

Borehole Diameter: 9"

ELEVATION

Land Surface: 280.7

Top of Casing: 283.99

Groundwater: 258.46 (26 Jul 85)

Drilling Started: 17 June 1985 (date) 0850 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 17 June 1985 (date) 1350 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0'-58'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 58'-68'

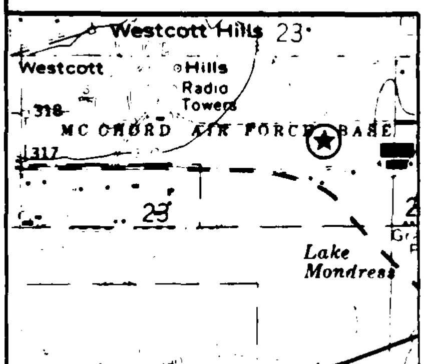
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 500 feet south of McChord AFB golf course clubhouse in open grass field south of Lincoln Blvd., approximately 1000 feet west of SAGE building.

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: NW¼ NE¼ 23

SAIC Science Applications International Corporation

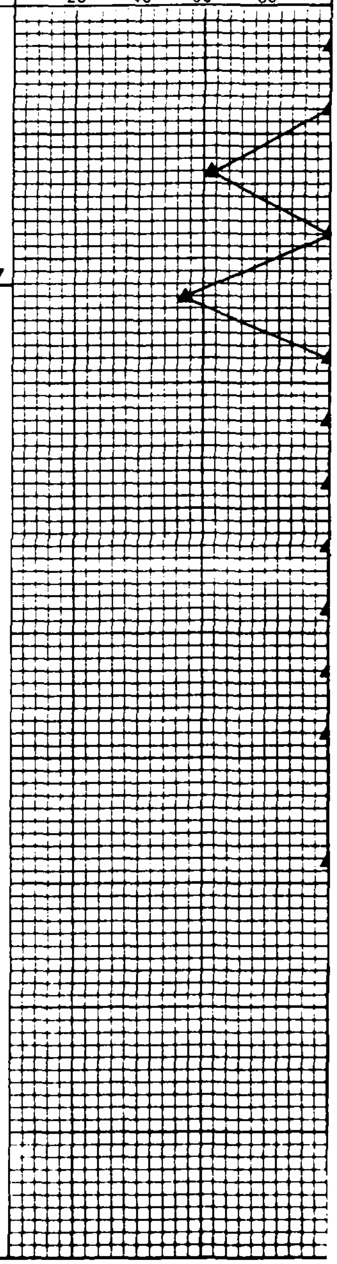
BORING LOG

PROJECT:	American Lake Garden Tract IRP Phase II, Stage 1	**LOCATION:**	Tacoma, Washington
WELL ID:	DZ14	**DATE:**	17 June 1985
SURFACE ELEVATION:	280.7	**GROUNDWATER ELEVATION:**	258.46 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-3 Organic mantle.		Grout
		3-35 Very coarse sand, very gravelly, varying amounts of clay and silt, poorly sorted, unconsolidated, greenish gray.		
270.66	10			
260.66	20			
250.66	30			Bentonite
		35-55 Medium sand, gravelly moderately sorted, unconsolidated, dark bluish gray.		
240.66	40			
		48-50 As above, clay and silt layer.		
230.66	50			
		55-68 Fine sand, well sorted unconsolidated, olive gray.		
220.66	60			Sand Pack
		68' Total Depth		
210.66	70			

GRAPHIC LOG

STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: TZ01

DRILLING SUMMARY

Total Depth: 73'

Borehole Diameter: 9"

ELEVATION

Land Surface: 272.7

Top of Casing: 276.45

Groundwater: 248.76 (26 Jul 85)

Drilling Started: 10 June 1985 (date) 0745 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 10 June 1985 (date) 1700 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-58'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 58-73'

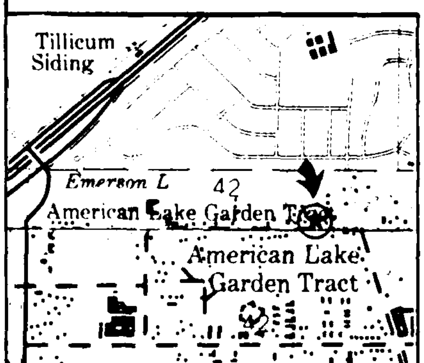
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet north of 146th Street S.W. at 7007 146th Street S.W. in the American Lake Garden Tract.

Lambert Coordinates: 59,955.98433 N, 95,090.27606 E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: NE¼ NE¼ 22

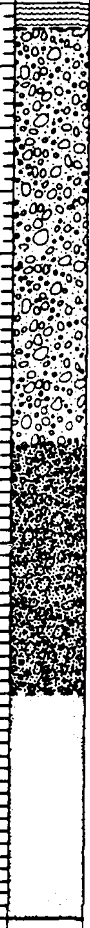
SAIC Science Applications International Corporation

BORING LOG

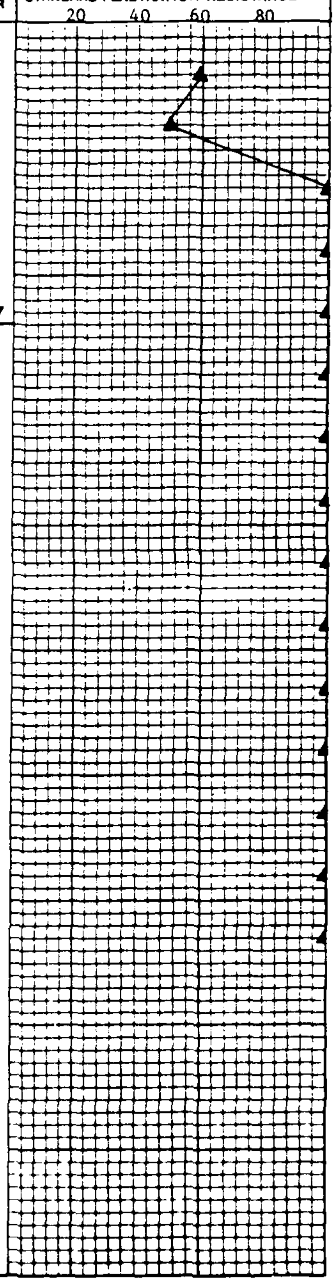
PROJECT:	American Lake Garden Tract IRP Phase II, Stage 1	LOCATION:	Tacoma, Washington
WELL ID:	TZ01	DATE:	10 June 1985
SURFACE ELEVATION:	272.7	GROUNDWATER ELEVATION:	248.76 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-2 Organic mantle. 2-35 Gravel with sand, silt and clay, poorly sorted, unconsolidated, olive gray.		Grout
262.70	10			
252.70	20			
242.70	30			Bentonite
232.70	40	35-55 Medium sand, gravelly, some silt and clay, poorly sorted, unconsolidated, olive gray		
222.70	50			
212.70	60	55-73 Medium sand, trace silt trace gravel, well sorted unconsolidated, olive gray.		Sand Pack
202.70	70	73' Total Depth		
192.70	80			

GRAPHIC LOG



STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ02

DRILLING SUMMARY

Total Depth: 68'

Borehole Diameter: 9"

ELEVATION

Land Surface: 264.8

Top of Casing: 268.29

Groundwater: 250.43 (26 Jul 85)

Drilling Started: 11 June 1985 (date) 0945 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 11 June 1985 (date) 1400 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-58'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 58-68'

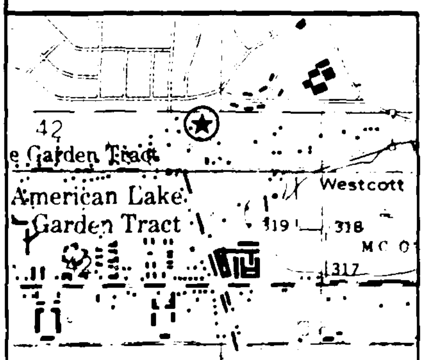
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Located in field towards the east of Woodbrook Market parking lot.

Lambert Coordinates: 60,394.89661 N, 95,902.89456 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NE¼ 22

SAIC Science Applications International Corporation

— BORING LOG —

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: TZ02 **DATE:** 11 June 1985

SURFACE ELEVATION: 264.8 **GROUNDWATER ELEVATION:** 250.43 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
		0-3 Organic mantle. 3-20 Gravel with silt, clay and sand, poorly sorted, unconsolidated, dusky yellow.		Grout	
254.79	10			Bentonite	
244.79	20	20-50 Medium sand with some silt, clay, and gravel, poorly sorted, unconsolidated, olive gray.			
234.79	30				
224.79	40	45-50 As above, increasing coarse sand.			
214.79	50	50-68 Medium sand, well sorted unconsolidated, olive gray.			
204.79	60			Sand Pack	
194.79	70	68' Total Depth			

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ03

DRILLING SUMMARY

Total Depth: 63'

Borehole Diameter: 9"

ELEVATION

Land Surface: 275.2

Top of Casing: 276.97

Groundwater: 250.89 (26 Jul 85)

Drilling Started: 12 June 1985 (date) 0915 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 12 June 1985 (date) 1400 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-53'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 53-63'

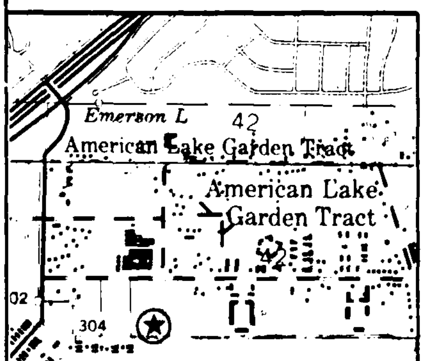
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: South of 150th Street S.W. on west side of the gravel extension of Spring Street. Approximately 50 feet north of the Fort Lewis chain link fence.

Lambert Coordinates: 57,998.61753 N, 93099.49301 E

Latitude: **Longitude:**

Twp: T19N **Rge:** R2E **Sec:** SE¼ NW¼ 22

SAIC Science Applications International Corporation

BORING LOG

PROJECT:	American Lake Garden Tract IRP Phase II, Stage 1	LOCATION:	Tacoma, Washington
WELL ID:	TZ03	DATE:	12 June 1985
SURFACE ELEVATION:	275.2	GROUNDWATER ELEVATION:	250.89 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-2 Organic mantle. 2-30 Medium sand with silt, clay and gravel, poorly sorted, unconsolidated, yellowish brown to olive gray.		Grout	
265.22	10					
255.22	20					
245.22	30		30-63 Medium sand, trace silt, well to moderately sorted, unconsolidated olive gray.		Bentonite	
235.22	40					
225.22	50					
215.22	60				Sand Pack	
			63' Total Depth			
205.22	70					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ04

DRILLING SUMMARY

Total Depth: 33'

Borehole Diameter: 9"

ELEVATION

- **Land Surface:** 275.4
- **Top of Casing:** 277.35
- **Groundwater:** 250.88 (26 Jul 85)

Drilling Started: 13 June 1985 (date) 0845 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 13 June 1985 (date) 0940 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 0-23'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 23-33'

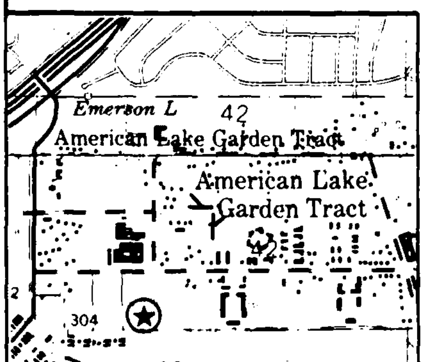
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: South of 150th Street S.W. on west side of the gravel extension of Spring Street. Approximately 60 feet north of the Fort Lewis chain link fence.

Lambert Coordinates: 58,010.76829 N, 93,100.16126 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NW¼ 22

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: TZ04 **DATE:** 13 June 1985

SURFACE ELEVATION: 275.4 **GROUNDWATER ELEVATION:** 250.88 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-2 Organic mantle. 2-33 Medium sand with silt, clay, and gravel, poorly sorted, unconsolidated, yellowish brown to olive gray.		Grout	
265.43	10				Bentonite	
255.43	20				Sand Pack	
245.43	30		33' Total Depth			
235.43	40					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: TZ05

DRILLING SUMMARY

Total Depth: 43'

Bo.ehole Diameter: 9"

ELEVATION

Land Surface: 266.3

Top of Casing: 268.20

Groundwater: 250.14 (26 Jul 85)

Drilling Started: 13 June 1985 (date) 1040 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 13 June 1985 (date) 1340 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-33'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 33-43'

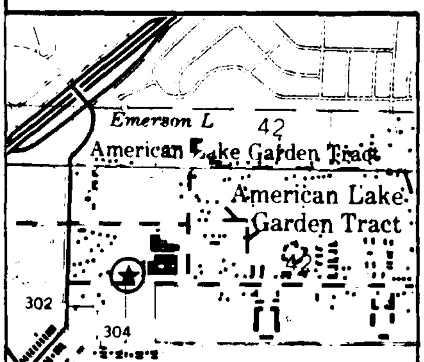
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Southeast corner of Woodbrook School yard 20 feet north of 150th Street S.W.

Lambert Coordinates: 58,670.65018 N, 92,358.19101 E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: SE¼ NW¼ 22

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

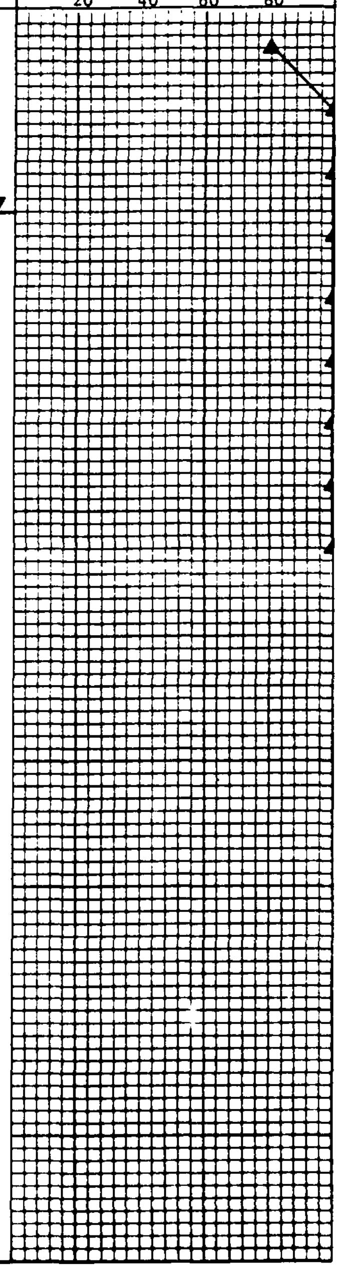
WELL ID: TZ05 **DATE:** 13 June 1985

SURFACE ELEVATION: 266.3 **GROUNDWATER ELEVATION:** 250.14 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-3 Organic mantle. 3-30 Gravel with clay, silt, and sand, poorly sorted, unconsolidated, light olive brown, clay and silt increase with depth.		Grout
256.28	10			Bentonite
246.28	20			
236.28	30	30-43 Coarse to medium sand well sorted, unconsolidated, olive gray.		Sand Pack
226.28	40	43' Total Depth		
216.28	50			

STANDARD PENETRATION RESISTANCE

20 40 60 80



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ06

DRILLING SUMMARY

Total Depth: 68'

Borehole Diameter: 9"

ELEVATION

Land Surface: 270.1

Top of Casing: 272.04

Groundwater: 247.05 (26 Jul 85)

Drilling Started: 14 June 1985 (date) 0825 (time)

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 14 June 1985 (date) 1300 (time)

Geologist: Gregory S. Mack

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-53'

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 53-68'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

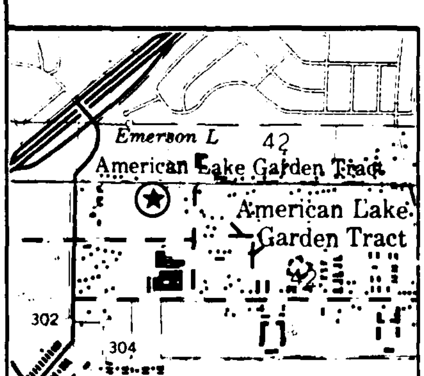
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: On North side of Woodbrook Jr. High athletic field. Approximately 20 feet south of 146th Street S.W.

Lambert Coordinates: 59,750.40091 N, 92,672.31455 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NW¼ 22

SAIC Science Applications International Corporation

— BORING LOG —

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: TZ06 **DATE:** 14 June 1985

SURFACE ELEVATION: 270.1 **GROUNDWATER ELEVATION:** 247.05 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-2 Organic mantle. 2-55 Gravelly very coarse sand with varying amounts of clay and silt, poorly sorted, unconsolidated brownish black, light olive gray to brownish gray.		Grout	
260.12	10					
250.12	20					
240.12	30				Bentonite	
230.12	40					
220.12	50					
			55-68 Fine sand, well sorted unconsolidated, olive gray to brownish black.			
210.12	60				Sand Pack	
200.12	70		68' Total Depth.			

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ07

DRILLING SUMMARY

Total Depth: 48'

Borehole Diameter: 9"

ELEVATION

Land Surface: 260.2

Top of Casing: 262.05

Groundwater: 245.40 (26 Jul 85)

Drilling Started: 18 June 1985 (date) 0930 (time)

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 18 June 1985 (date) 1130 (time)

Geologist: Gregory S. Mack

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-38'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 38-48'

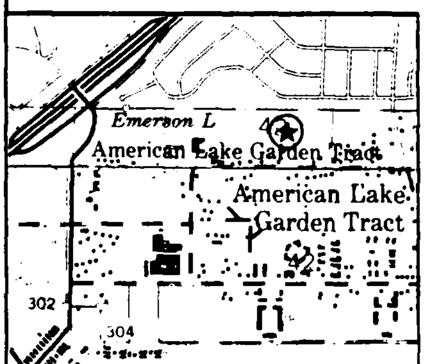
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: In back of 7209 146th Street S.W. Approximately 300 feet north of 146th Street S.W., in a grass field next to a barbed wire fence. Just east of gravel road to Buck's Trailer Court at 7305 146th Street S.W.

Lambert Coordinates: 60,297.42911 N, 94,188.91940 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ NE¼ 22

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract IRP Phase II, Stage I

LOCATION: Tacoma, Washington

WELL ID: TZ07

DATE: 18 June 1985

SURFACE ELEVATION: 260.2

GROUNDWATER ELEVATION: 245.40 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-4 Organic mantle.		Grout	
			4-35 Gravel with varying amounts of silt, clay and sand, poorly sorted, unconsolidated, dark yellowish orange to brownish black.			
250.22	10					
240.22	20				Bentonite	
			25-35 As above, grading to dark bluish gray to dark yellowish brown.			
230.22	30					
			35-48 Very coarse sand to coarse sand with some gravel, moderately sorted, unconsolidated brownish black to dark bluish gray.			
220.22	40				Sand Pack	
			48' Total Depth			
210.22	50					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ08

DRILLING SUMMARY

Total Depth: 43'

Borehole Diameter: 9"

ELEVATION

- **Land Surface:** 279.3
- **Top of Casing:** 281.76
- **Groundwater:** 253.83 (26 Jul 85)

Drilling Started: 1 July 1985 (date) 1210 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 2 July 1985 (date) 0920 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 0-33'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 33-43'

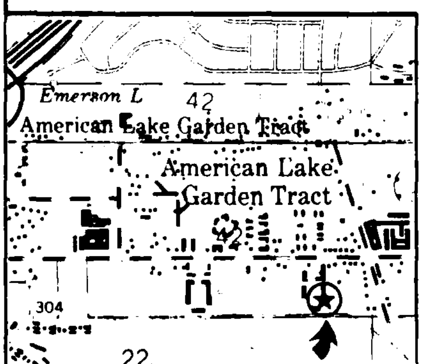
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: South of the southeast parking lot of the Western Spur Apartments (6824 150th Street S.W.), in the American Lake Garden Tract.

Lambert Coordinates: 58,003.78678 N, 95,399.21130 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ SE¼ 22

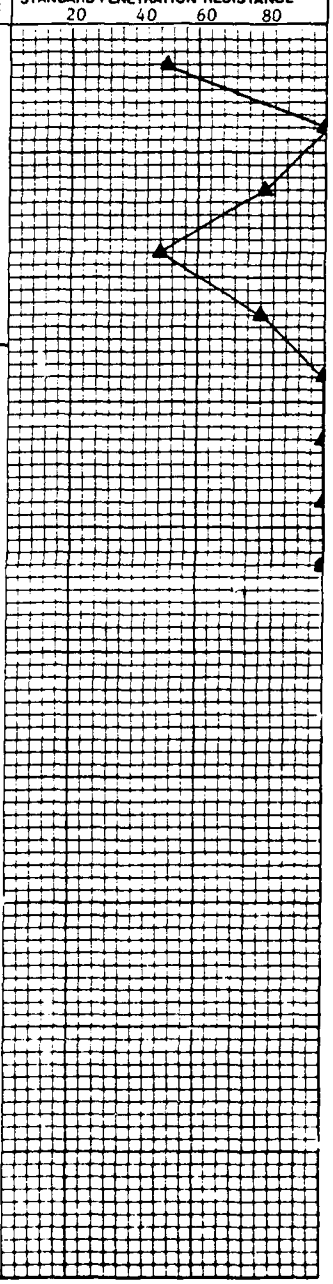
SAIC Science Applications International Corporation

BORING LOG

PROJECT:	American Lake Garden Tract IRP Phase II, Stage 1	LOCATION:	Tacoma, Washington
WELL ID:	TZ08	DATE:	1-2 July 1985
SURFACE ELEVATION:	279.3	GROUNDWATER ELEVATION:	253.83 (26 Jul 85)

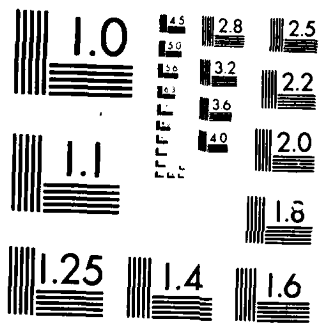
ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-4 Organic mantle.		Grout
		4-25 Fine to medium pebble gravel, fine to medium sand, trace of silt, poorly sorted, unconsolidated, dark to light olive gray.		
269.34	10			
259.34	20			Bentonite
		25-30 Coarse to fine sand, very fine pebbly, with some medium to coarse pebbles and clay, very poorly sorted, unconsolidated, light olive gray.		
249.34	30	30-43 Coarse sand, very fine to medi m pebbly, trace of silt, very poorly sorted, unconsolidated, olive gray.		Sand Pack
239.34	40			
		43' Total Depth		
229.34	50			

STANDARD PENETRATION RESISTANCE



AD-A164 835 INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION S..(U) SCIENCE APPLICATIONS INTERNATIONAL CORP BELLEVE WA R W GREILLING ET AL. 3/4

UNCLASSIFIED 20 DEC 85 SAIC-85/1791 F33615-80-D-4002 F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS 1963 A

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: TZ09

DRILLING SUMMARY

Total Depth: 43'

Borehole Diameter: 9"

ELEVATION

Land Surface: 256.1

Top of Casing: 258.80

Groundwater: 243.50 (26 Jul 85)

Drilling Started: 2 July 1985 (date) 1040 (time)

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 2 July 1985 (date) 1300 (time)

Geologist: Gregory S. Mack

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-33'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 33-43'

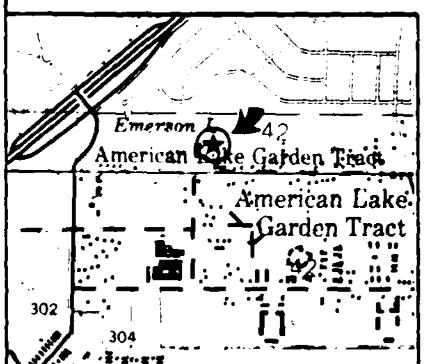
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: At the northeast corner of the parking lot at Cypress Greens Apartments (7515 146th Street S.W.), in the American Lake Garden Tract.

Lambert Coordinates: 60,214.38900 N, 93,364.36588 E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: NW¼ NE¼ 22

SAIC Science Applications International Corporation

BORING LOG

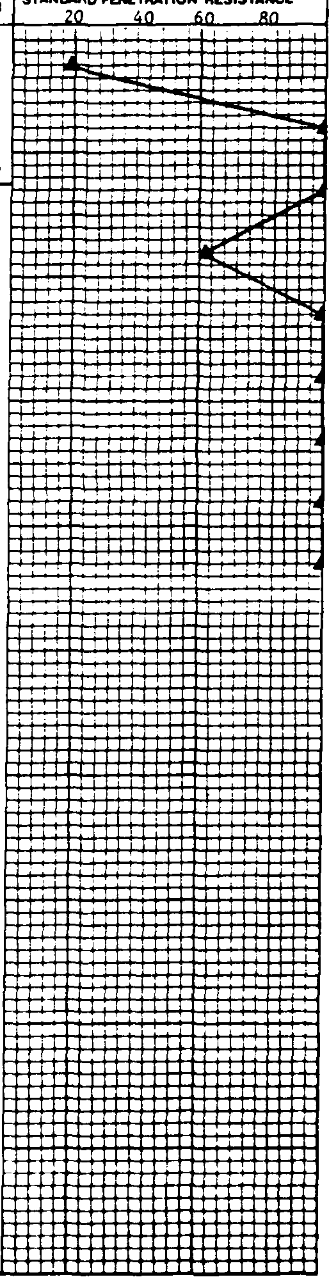
PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: TZ09 **DATE:** 2 July 1985

SURFACE ELEVATION: 256.1 **GROUNDWATER ELEVATION:** 243.50 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
	0	0-5 Organic mantle.		Grout
	5	5-30 Very fine to coarse pebble gravel with some silt, trace of clay, very poorly sorted, unconsolidated, light olive gray.		
246.13	10			Bentonite
236.13	20			
226.13	30	30-43 Fine to coarse sand with some fine to medium pebbles, trace of silt, very poorly sorted, unconsolidated, light olive gray.		Sand Pack
216.13	40			
	43	43' Total Depth		
206.13	50			

STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1   Well ID: TZ10

DRILLING SUMMARY

Total Depth: 53'

Borehole Diameter: 9"

ELEVATION

Land Surface: 253.6

Top of Casing: 256.02

Groundwater: 244.25 (26 Jul 85)

Drilling Started: 3 July 1985 (date) 0830 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 3 July 1985 (date) 1330 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-43'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 43-53'

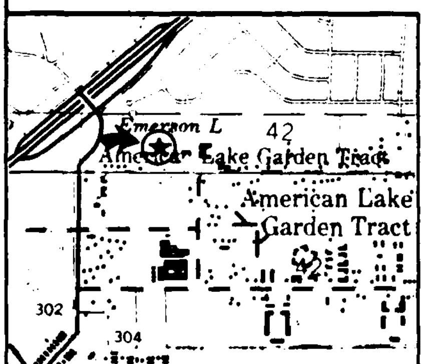
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: In the rear of 7715 146th Street S.W. From the house, the borehole is located to the north, down a steep slope, next to wire fence on the southern edge of horse stables.

Lambert Coordinates: 60,088.83921 N, 92,739.74146 E

Latitude: Longitude:

Twp: 19N   Rge: 2E   Sec: NW¼ NE¼ 22

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract
IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: TZ10

DATE: 3 July 1985

SURFACE ELEVATION: 253.6

GROUNDWATER ELEVATION: 244.25 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-3 Organic mantle with boulders 3-15 Fine to very coarse sand with some cobbles, silt and a trace of clay, very poorly sorted, light olive gray.		Grout	
243.60	10					
			15-20 Clay-silt mud, very coarse to fine sandy with trace of pebbles, very poorly sorted, unconsolidated, light olive gray.			
233.60	20		20-35 Very fine to coarse pebble gravel with some fine to coarse sand, and trace of clay and silt, very poorly sorted, unconsolidated, light olive gray.		Bentonite	
223.60	30					
			35-40 Medium to fine sand with some clay and silt, very poorly sorted, unconsolidated, light olive gray.			
213.60	40		40-53 As above, with decreasing silt and clay sizes, some cobbles with depth.		Sand Pack	
203.60	50					
			53' Total Depth			
193.60	60					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ11

DRILLING SUMMARY

Total Depth: 44'

Borehole Diameter: 9"

ELEVATION

Land Surface: 270.1

Top of Casing: 272.78

Groundwater: 250.75 (26 Jul 85)

Drilling Started: 13 July 1985 (date) 1610 (time)

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 14 July 1985 (date) 1030 (time)

Geologist: Gregory S. Mack

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-28'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 28-38'

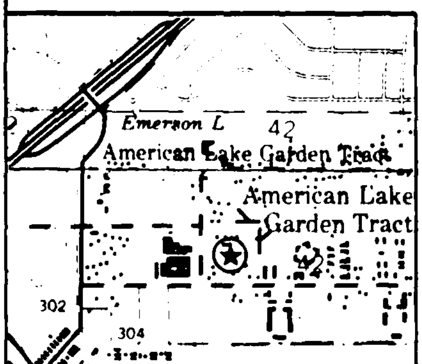
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: At Woodbrook Apartments on Spring Street on south side of "U"-shaped driveway, about halfway between street and apartment buildings.

Lambert Coordinates: 58,933.46667 N, 93,468.37093 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ SE¼ 22

SAIC Science Applications International Corporation

BORING LOG

PROJECT: American Lake Garden Tract
IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: TZ11

DATE: 13-14 July 1985

SURFACE ELEVATION: 270.1

GROUNDWATER ELEVATION: 250.75 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-3 Organic mantle with some boulders and cobbles.		Grout	
260.11	10		3-15 Cobble gravel, fine to medium to coarse sand, trace silt, very poorly sorted, unconsolidated, light olive gray.		Bentonite	
250.11	20		15-27 Very coarse sand, very fine to fine pebbly, some medium to fine sand, trace of silt and clay, very poorly sorted, unconsolidated, light olive gray.		Bentonite	
240.11	30		27-44 Fine to coarse sand with some very fine to fine pebbles, some silt and clay, very poorly sorted, unconsolidated, light olive gray.		Sand Pack	
230.11	40					
			44' Total Depth			
220.11	50					
210.11	60					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** TZ12

DRILLING SUMMARY

Total Depth: 58'

Borehole Diameter: 9"

ELEVATION

Land Surface: 273.0

Top of Casing: 272.78

Groundwater: 252.87 (26 Jul 85)

Drilling Started: 14 July 1985 (date) 1420 (time)

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 14 July 1985 (date) 1740 (time)

Geologist: Gregory S. Mack

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-48'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 48-58'

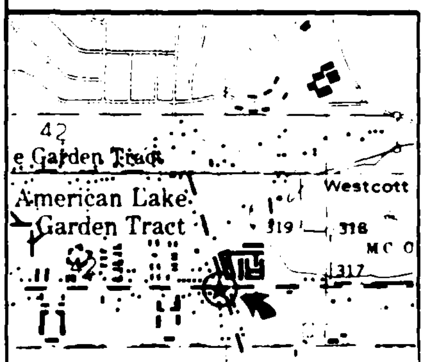
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 8" I.D. concrete valve box with locking cover set at grade level.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: On the right-of-way at the southwest corner at the intersection of 150th Street S.W. and Woodbrook Drive.

Lambert Coordinates: 58,517.75185 N, 95,915.52229 E

Latitude:

Longitude:

Twp: 19N **Rge:** 2E **Sec:** NE¼ SE¼ 22

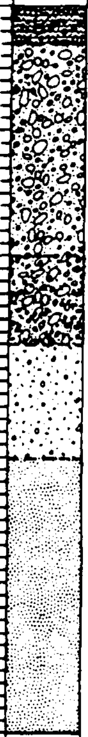
SAIC Science Applications International Corporation

—— BORING LOG ——

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: TZ12 **DATE:** 14 July 1985

SURFACE ELEVATION: 273.0 **GROUNDWATER ELEVATION:** 252.87 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-3 Organic mantle with cobbles and boulders.		Grout	
263.03	10		3-20 Cobble gravel with some fine to medium sand, trace very coarse sand and very fine to medium pebbles, very poorly sorted, unconsolidated, light olive gray.			
253.03	20		20-27 Very fine to fine pebble gravel with some very coarse to coarse sand, trace of silt and clay, very poorly sorted, unconsolidated, light olive gray to dark medium bluish gray.		Bentonite	
243.03	30		27-36 Coarse to fine sand with some very fine to fine pebbles, trace of silt and clay, very poorly sorted, unconsolidated, olive gray.			
233.03	40		36-52 Coarse to fine sand, silty and clayey, with some very fine to fine pebbles and very coarse sand, very poorly sorted, light olive gray.			
223.03	50				Sand Pack	
213.03	60		58' Total Depth			

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: LZ01

DRILLING SUMMARY

Total Depth: 48'

Borehole Diameter: 9"

ELEVATION

Land Surface: 268.8

Top of Casing: 272.21

Groundwater: 249.77 (26 Jul 85)

Drilling Started: 26 June 1985 (date) 0930 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 26 June 1985 (date) 1400 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-38'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 38-48'

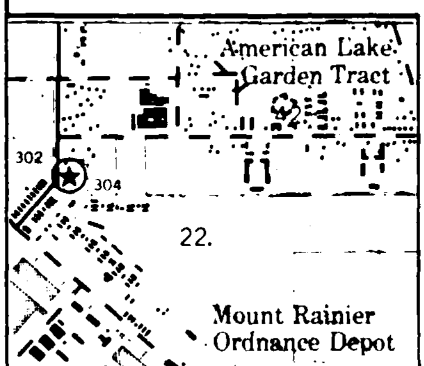
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 300 feet east of Logistics Center Gate at Fort Lewis and 40 feet north of Fort Lewis boundary fence.

Lambert Coordinates: 58,188.06564 N, 91,916.69764 E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: NW¼ SW¼ 22

SAIC Science Applications International Corporation

— BORING LOG —

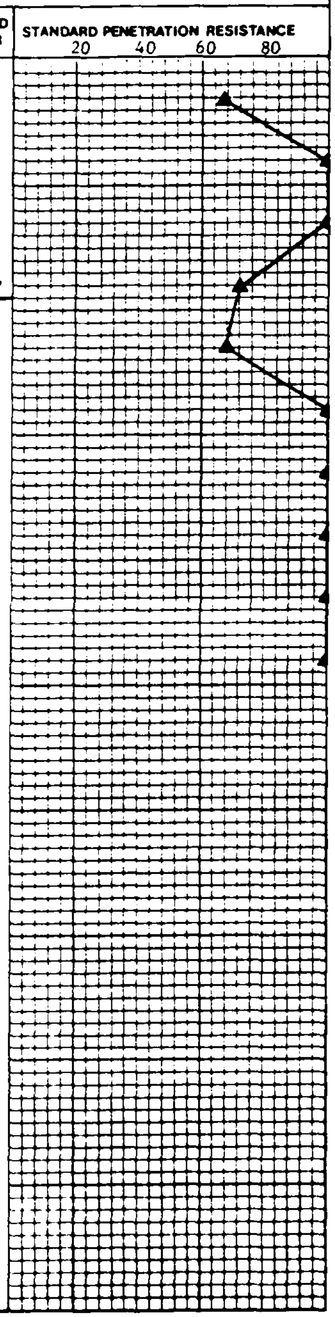
PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: LZ01 **DATE:** 26 June 1985

SURFACE ELEVATION: 268.8 **GROUNDWATER ELEVATION:** 249.77 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-3 Organic mantle		Grout
258.79	10	3-20 Large cobble gravel with some medium to very fine pebbles medium to coarse sand, and trace of silt and clay, very poorly sorted, unconsolidated, light olive gray.		
248.79	20	20-25 Very coarse to medium sand with some medium pebbles, trace clay and silt, very poorly sorted unconsolidated, dark olive gray. 25-48 Fine pebble gravel, medium to very coarse sand, with trace of silt and clay, very poorly sorted, unconsolidated, dark bluish gray.		Bentonite
238.79	30			
228.79	40			Sand Pack
218.79	50	48' Total Depth		

STANDARD PENETRATION RESISTANCE



SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: LZ02

DRILLING SUMMARY

Total Depth: 28'

Borehole Diameter: 9"

ELEVATION

Land Surface: 268.6

Top of Casing: 271.12

Groundwater: 249.72 (26 Jul 85)

Drilling Started: 27 June 1985 (date) 0800 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 27 June 1985 (date) 1200 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-18'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 18-28'

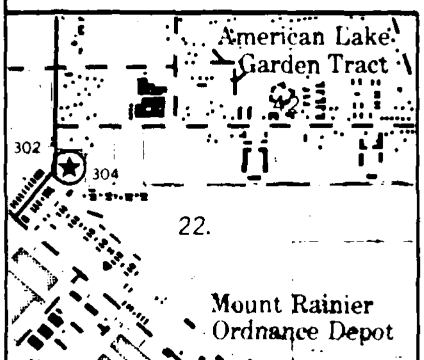
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: 15 feet west of LZ01, approximately 300 feet east of Logistics Center Gate at Fort Lewis and approximately 40 feet north of Fort Lewis boundary fence.

Lambert Coordinates: 58,196.94653 N, 91,905.25312 E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: NW¼ SW¼ 22

SAIC Science Applications International Corporation

— BORING LOG —

PROJECT: American Lake Garden Tract IRP Phase II, Stage 1 **LOCATION:** Tacoma, Washington

WELL ID: LZ02 **DATE:** 27 June 1985

SURFACE ELEVATION: 268.6 **GROUNDWATER ELEVATION:** 249.72 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-3 Organic mantle. 3-20 Large cobble gravel with some medium to very fine pebbles medium to coarse sand and trace of silt and clay, very poorly sorted, unconsolidated, light olive gray.		Grout Bentonite	
258.62	10					
248.62	20		20-28 Very coarse to medium sand with some medium pebbles, trace of silt and clay, very poorly sorted, unconsolidated, dark bluish gray. 28' Total Depth		Sand Pack	
238.62	30					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 Well ID: LZ03

DRILLING SUMMARY

Total Depth: 63'

Borehole Diameter: 9"

ELEVATION

Land Surface: 275.5

Top of Casing: 279.06

Groundwater: 258.96 (26 Jul 85)

Drilling Started: 27 June 1985 (date) 1330 (time)

Geologist: Gregory S. Mack

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 28 June 1985 (date) 0830 (time)

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 0-29'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

Material: PVC

Diameter: 2.0" ID 2.375" OD

Depth: 29-49'

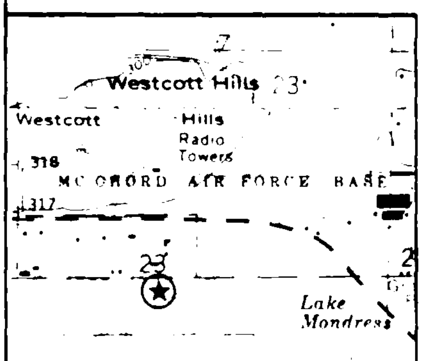
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: On Fort Lewis, in low area, 100 feet south of the Foxwood Farm southeast corner post.

Lambert Coordinates: 57,756.98780 N, 98,725.49332 E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: NE¼ SW¼ 23

SAIC Science Applications International Corporation

BORING LOG

PROJECT:	American Lake Garden Tract IRP Phase II, Stage 1	LOCATION:	Tacoma, Washington
WELL ID:	LZ03	DATE:	27-28 June 1985
SURFACE ELEVATION:	275.5	GROUNDWATER ELEVATION:	258.96 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE 20 40 60 80
			0-3 Organic mantle.		Grout	
			3-25 Cobble gravel, coarse to medium sandy, with some boulders, clay, and silt, very poorly sorted, unconsolidated, light olive gray.			
265.48	10				Bentonite	
255.48	20					
			25-50 Very fine to coarse pebble gravel with varying amounts of clay and silt, very poorly sorted, unconsolidated, dark bluish gray to light olive gray.			
245.48	30				Sand Pack	
235.48	40					
225.48	50		50-63 Coarse to medium sand, very fine to medium pebbly with some very fine to fine sand, trace of silt and clay, very poorly sorted, unconsolidated, brownish gray to light olive gray.			
215.48	60					
			63' Total Depth			
205.48	70					

SAIC

WELL CONSTRUCTION SUMMARY

Project: American Lake Garden Tract IRP Phase II, Stage 1 **Well ID:** LZ04

DRILLING SUMMARY

Total Depth: 63'

Borehole Diameter: 9"

ELEVATION

- **Land Surface:** 277.2
- **Top of Casing:** 279.98
- **Groundwater:** 255.16 (26 Jul 85)

Drilling Started: 28 June 1985 (date) 1230 (time)

Driller: Kring Drilling Co., Inc.
P.O. Box 817
Milton, Washington 98354

Rig Type: Mobile B-61

Bit(s): Carbide Tooth

Drilling Fluid: None

Drilling Completed: 1 July 1985 (date) 0940 (time)

Geologist:

Technician:

NOTES: Borehole drilling performed with 4" I.D. hollow stem auger.

WELL DESIGN

BLANK CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 0-53'

JOINTS: (type) Threaded

Filter Material: 16 grade silica sand

SLOTTED CASING

- **Material:** PVC
- **Diameter:** 2.0" ID 2.375" OD
- **Depth:** 53-63'

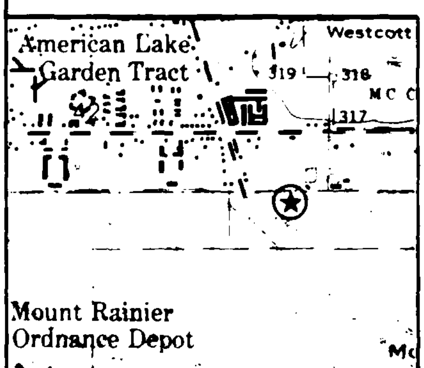
JOINTS: (type) Threaded

GROUT: (type) Bentonite/cement

Surface Monument: 4" square x 5' steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 250 feet to the southwest of Brookwood Stable's large barn on Fort Lewis property.

Lambert Coordinates: 57,762.31552 N, 96,750.02155 E

Latitude:

Longitude:

Twp: 19N **Rge:** 2E **Sec:** NW¼ SE¼ 23

SAIC Science Applications International Corporation

— BORING LOG —

PROJECT: American Lake Garden Tract
IRP Phase II, Stage 1

LOCATION: Tacoma, Washington

WELL ID: LZ04

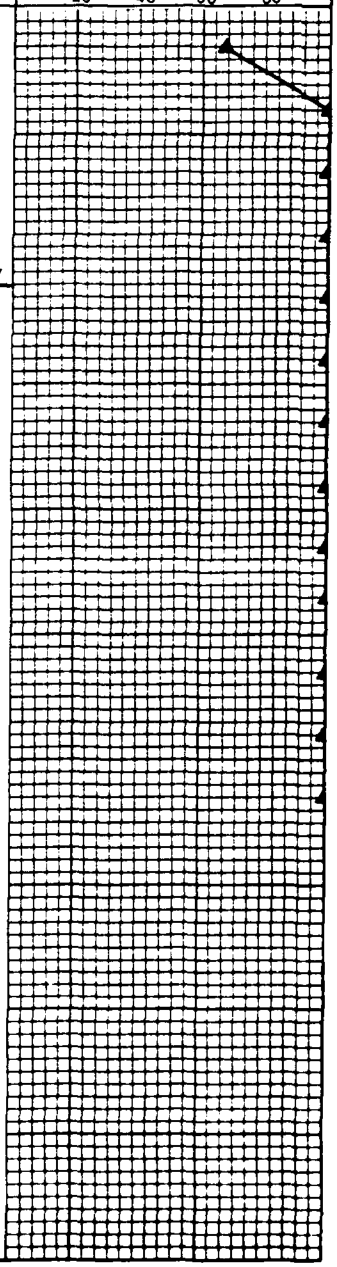
DATE: 28 June - 1 July 1985

SURFACE ELEVATION: 277.2

GROUNDWATER ELEVATION: 255.16 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER
		0-2 Organic mantle.		Grout
267.23	10	2-30 Coarse to medium sand, medium to very fine pebbly with some coarse to very coarse pebbles, silt and trace of clay, very poorly sorted, unconsolidated, light olive gray to gray blue-green.		
257.23	20			Bentonite
247.23	30	30-35 Coarse to fine sand with some coarse to very fine pebbles, trace of silt and clay, moderately sorted, unconsolidated, dark greenish gray.		
237.23	40	35-50 Unknown due to poor sample recovery.		
227.23	50	50-63 Coarse to fine sand, medium to very fine pebbles with a trace of very fine sand, silt, and clay, very poorly sorted, unconsolidated, dark yellowish brown to dusky blue.		Sand Pack
217.23	60	63' Total Depth		
207.23	70			

STANDARD PENETRATION RESISTANCE
20 40 60 80



WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-1

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

Land Surface: 274.7

Top of Casing: 276.85

Groundwater: 256.72 (26 Jul 85)

Drilling Started: 19 Nov 84 (date) (time)

Geologist:

Driller: Richardson Drilling, Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 11 Jan 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 20-60'

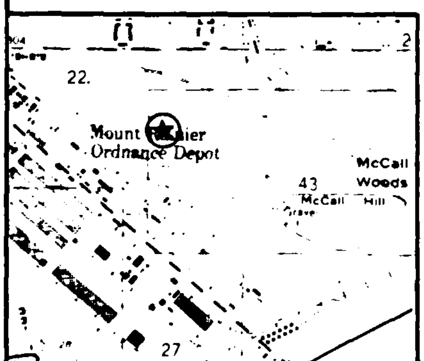
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 1,250 feet south of Fort Lewis Logistics Center north boundary at far north end of North "L" Street.

Lambert Coordinates: 656710.44N, 1494588.47E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ SE¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

—— BORING LOG ——

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-1 **DATE:** 19-29 Nov 84

SURFACE ELEVATION: 274.7 **GROUNDWATER ELEVATION:** 256.72 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-30 Loose to very dense, damp to saturated, sandy to very sandy gravey and gravelly sand. Slightly cobbly near top. Color of fines generally olive gray.			
264.7	10					
254.7	20				7/26	
244.7	30		30-40 Loose to very dense, saturated, interbedded, clean, fine to medium sand, slightly gravelly to very gravelly sand, and minor very cobbly gravel, grading downward to clean, medium to coarse sand. Color of fines (where present) greenish gray to olive brown.			
234.7	40		40-43 Loose to very dense, saturated, interbedded, clean fine to medium sand, slightly gravelly to very gravelly sand, and minor very cobbly gravel, grading downward to clean, medium to coarse sand.			
224.7	50		43-59 Very dense, saturated, very sandy gravel and gravelly sand. Color of fines mottled greenish gray and olive.			
214.7	60		59-61 Medium dense, saturated, clean, medium sand.			
204.7	70		61' Total Depth			

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-2

DRILLING SUMMARY

Total Depth: 61'
Borehole Diameter: 6"
ELEVATION
Land Surface: 270.4
Top of Casing: 272.59
Groundwater: 253.71 (26 Jul 85)
Drilling Started: 8 Jan 85 (date) (time)
Geologist:
NOTES:

Driller: Richardson Drilling
Tacoma, WA
Rig Type: 71 Speedstar Cable Tool
Bit(s):
Drilling Fluid:
Drilling Completed: 11 Jan 85 (date) (time)
Technician:

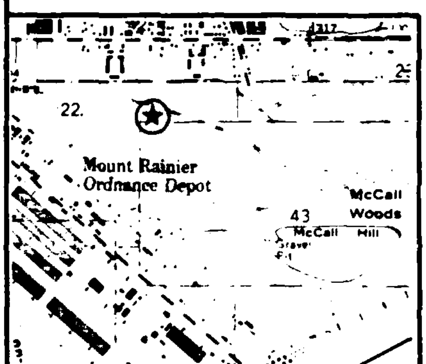
WELL DESIGN

BLANK CASING
Material: PVC - Sch. 40
Diameter: 4" **ID** 4.50" **OD**
Depth: 0-20'
JOINTS: (type) Threaded
Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING
Material: PVC Sch. 40
Diameter: 4" **ID** 4.50" **OD**
Depth: 20-60'
JOINTS: (type) Threaded
GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.
NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 500 feet south of Fort Lewis Logistics Center north boundary, approximately 1100 feet east of Bldg. 9601 (Transmitter Bldg.)

Lambert Coordinates: 657230.34N, 1494504.58E

Latitude: **Longitude:**

Twp: 19N **Rge:** R2E **Sec:** SW¼ NE¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1345-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC-2	**DATE**	8-11 Jan 85
SURFACE ELEVATION:	270.4	**GROUNDWATER ELEVATION:**	253.71 (26 Jul 85)

ELEV	DEPTH	GEOLOGIC DESCRIPTION
		0-29 Loose to very dense, moist to saturated, slightly sandy to sandy gravel. Fines are generally olive brown to olive.
260.4	10	
250.4	20	
		29-61 Loose except where gravel present, saturated, coarse and medium sand grading downward to medium sand, locally trace gravel.
240.4	30	
230.4	40	
220.4	50	
210.4	60	61' Total Depth
200.4	70	

Other column headings: GRAPHIC LOG, SAMPLES, GROUND WATER, STANDARD PENETRATION RESISTANCE

GROUND WATER: 7/26

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-3

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

- **Land Surface:** 273.7
- **Top of Casing:** 275.97
- **Groundwater:** 253.90 (26 Jul 85)

Drilling Started: 29 Nov 84 (date) (time)

Geologist:

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 6 Dec 84 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 4" ID 4.50" OD
- **Depth:** 0-20'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC Sch. 40
- **Diameter:** 4" ID 4.50" OD
- **Depth:** 20-60'

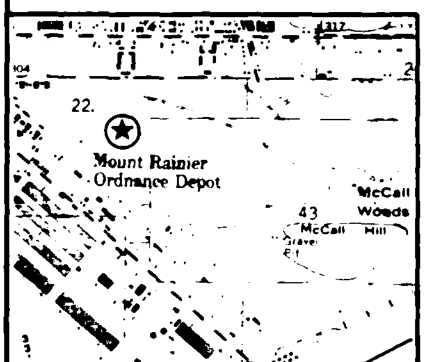
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 800 feet south of Fort Lewis Logistics Center north boundary, approximately 600 feet southeast of Bldg. 9601 (Transmitter Bldg.)

Lambert Coordinates: 657303.04N, 1493903.83E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ SE¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID LC-3 **DATE** 29 Nov - 6 Dec 84

SURFACE ELEVATION 273.7 **GROUNDWATER ELEVATION:** 253.90 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-19 Loose to medium dense, wet to saturated, sandy gravel to gravelly sand. Color of fines is olive gray to olive.			
262.7	10					
253.7	20		19-27 Loose, saturated, clean, fine to medium sand with minor interbeds of clean, slightly sandy gravel.		7/26	
243.7	30		27-32 Very dense, saturated, sandy, very cobbly gravel. Color of fines is pale olive.			
			32-60 Loose to dense, saturated, clean sand, with minor interbeds of clean, gravelly sand and clean, very sandy gravel.			
233.7	40					
223.7	50					
213.7	60		61' Total Depth			
203.7	70					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-4

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

Land Surface: 267.8

Top of Casing: 269.64

Groundwater: 250.37 (26 Jul 85)

Drilling Started: 7 Dec 84 (date) (time)

Geologist:

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 17 Dec 84 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 20-60'

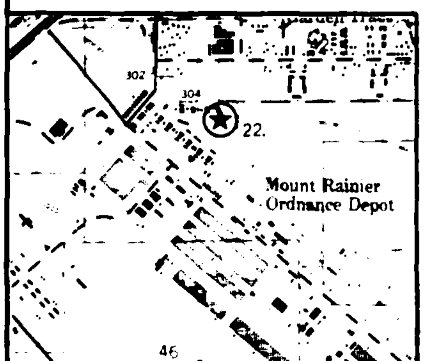
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 300 feet south of Fort Lewis Logistics Center north boundary, on the south shoulder approximately 200 feet west of the end of Langley Ave.

Lambert Coordinates: 657705.95N, 1492727.99E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NW¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

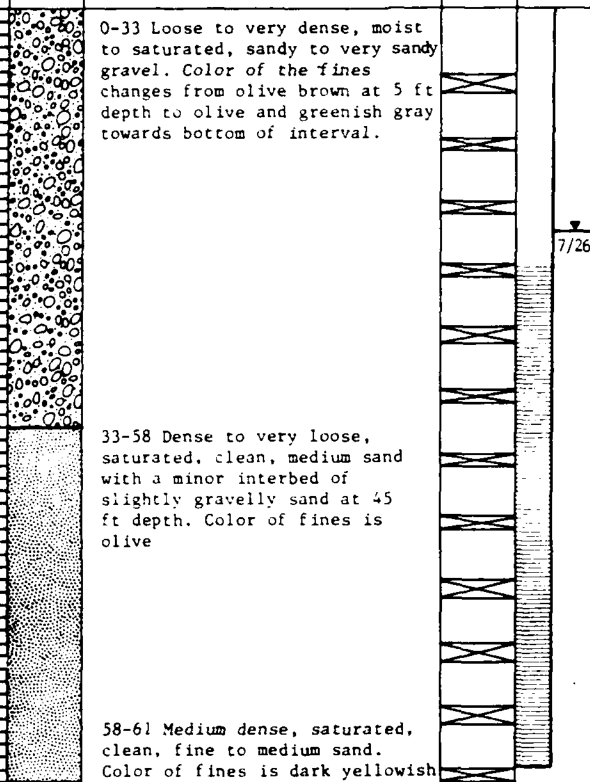
BORING LOG

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-4 **DATE:** 7-17 Dec 84

SURFACE ELEVATION: 267.8 **GROUNDWATER ELEVATION:** 250.37 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-33 Loose to very dense, moist to saturated, sandy to very sandy gravel. Color of the fines changes from olive brown at 5 ft depth to olive and greenish gray towards bottom of interval.			
257.8	10					
247.8	20				7/26	
237.8	30					
			33-58 Dense to very loose, saturated, clean, medium sand with a minor interbed of slightly gravelly sand at 45 ft depth. Color of fines is olive			
227.8	40					
217.8	50					
			58-61 Medium dense, saturated, clean, fine to medium sand. Color of fines is dark yellowish brown.			
207.8	60		61' Total Depth			
197.8	70					



WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-5

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

Land Surface: 276.4

Top of Casing: 278.74

Groundwater: 249.44 (26 Jul 85)

Drilling Started: 19 Dec 84 (date) (time)

Geologist:

NOTES:

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 28 Dec 84 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 20-60'

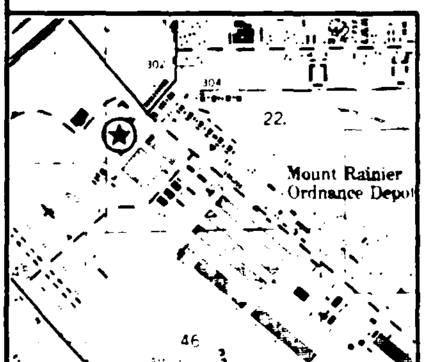
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 75 feet west of the intersection of South "A" Street and Prescott Ave. at the Fort Lewis Logistics Center.

Lambert Coordinates: 657293.02N, 1490856.94E

Latitude: **Longitude:**

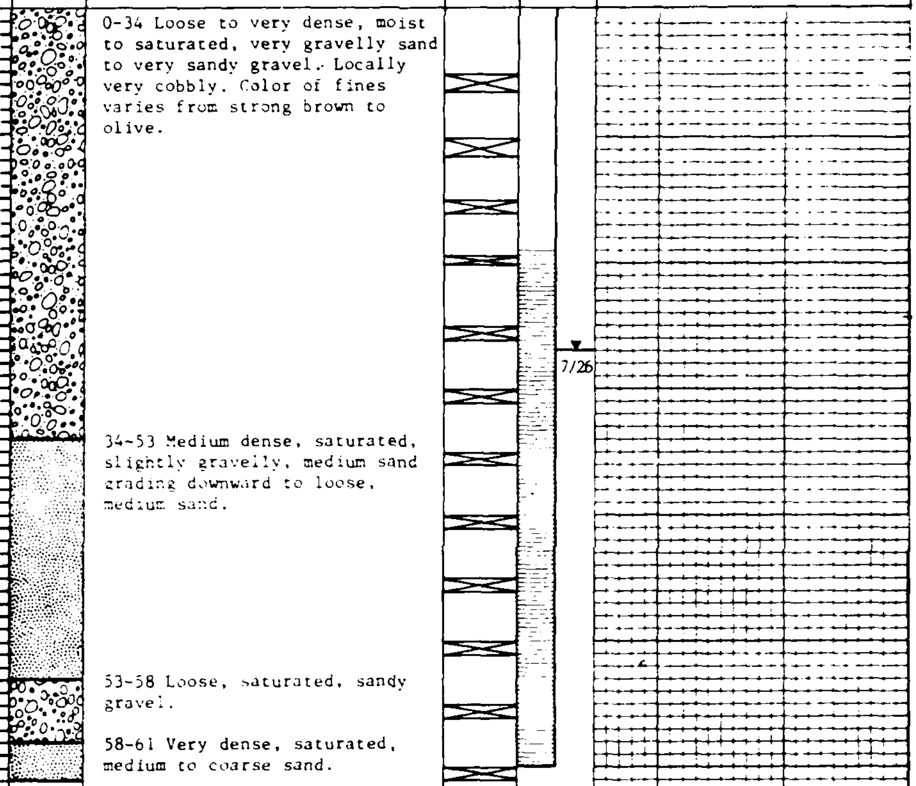
Twp: 19N **Rge:** 2E **Sec:** NW¼, SW¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

— BORING LOG —

PROJECT	Logistics Center, Fort Lewis, WA (USCOE 1345-04)	**LOCATION**	Fort Lewis, Washington
WELL ID	LC-5	**DATE**	19-28 Dec 84
SURFACE ELEVATION	276.4	**GROUNDWATER ELEVATION**	249.44 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-34 Loose to very dense, moist to saturated, very gravelly sand to very sandy gravel. Locally very cobbly. Color of fines varies from strong brown to olive.			
266.4	10					
256.4	20					
					7/26	
246.4	30					
			34-53 Medium dense, saturated, slightly gravelly, medium sand grading downward to loose, medium sand.			
236.4	40					
226.4	50					
			53-58 Loose, saturated, sandy gravel.			
			58-61 Very dense, saturated, medium to coarse sand.			
216.4	60					
			61' Total Depth			
206.4	70					



WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-6

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

Land Surface: 284.6

Top of Casing: 287.28

Groundwater: 259.49 (26 Jul 85)

Drilling Started: 2 Jan 85 (date) (time)

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 7 Jan 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 20-60'

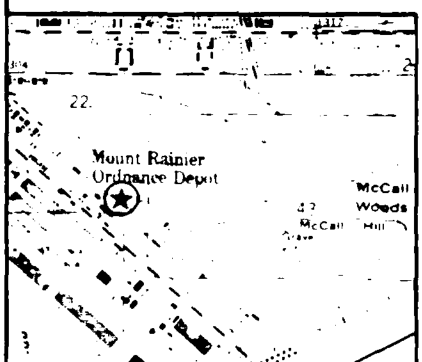
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet north of the intersection of North "L" Street and Benton Ave. at the Fort Lewis Logistics Center.

Lambert Coordinates: 655904.94N, 1493991.41E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SW¼ SE¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

—— BORING LOG ——

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-6 **DATE:** 2-7 Jan 85

SURFACE ELEVATION: 284.6 **GROUNDWATER ELEVATION:** 259.49 (26 Jul 85)

ELEV.	DEPTH	GEOLOGIC DESCRIPTION
		0-18 Loose to medium dense, moist to wet, sandy gravel to very gravelly sand. Color of fines varies from olive to brown.
274.6	10	
		18-29 Medium dense to dense, moist to wet, slightly gravelly, medium sand to very sandy gravel interbedded with clean, fine to medium sand. Fines are mottled olive and olive brown.
264.6	20	
		29-44 Medium dense to very dense, saturated, slightly sandy to sandy gravel. Fines are generally olive.
254.6	30	
244.6	40	
		44-61 Very loose to very dense, saturated, coarse to medium sand grading down to medium sand.
234.6	50	
224.6	60	61' Total Depth
214.6	70	

GRAPHIC LOG | SAMPLES | GROUND WATER: 7/26 | STANDARD PENETRATION RESISTANCE

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-7

DRILLING SUMMARY

Total Depth: 46'

Borehole Diameter: 6"

ELEVATION

Land Surface: 287.2

Top of Casing: 289.19

Groundwater: 256.64 (26 Jul 85)

Drilling Started: 14 Jan 85 (date) (time)

Geologist:

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 17 Jan 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 20-40'

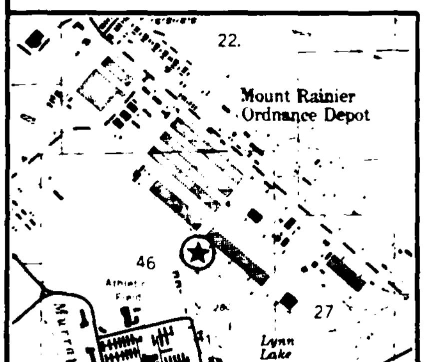
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet east of the Madigan Gate on South "L" Street at the Fort Lewis Logistics Center.

Lambert Coordinates: 654122.58N, 1492794.98E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NW¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-7 **DATE:** 14-17 Jan 85

SURFACE ELEVATION: 287.2 **GROUNDWATER ELEVATION:** 256.64 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-24 Loose, moist to wet, slightly silty, sandy gravel, locally cobbly. Color of fines varies from dark grayish-brown to olive.			
277.2	10					
267.2	20					
			24-38 Medium dense to very dense, saturated, slightly silty to silty, very gravelly fine sand to sandy gravel. Color of fines is olive gray.			
257.2	30				7/26	
			38-43 Hard, damp, slightly gravelly silt. Color of fines is light olive gray.			
247.2	40					
			43-46 Very dense, saturated, interbedded medium sand and slightly silty, sandy gravel.			
237.2	50		46' Total Depth			

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-8

DRILLING SUMMARY

Total Depth: 60'

Borehole Diameter: 6"

ELEVATION

Land Surface: 287.2

Top of Casing: 289.46

Groundwater: 256.74 (26 Jul 85)

Drilling Started: 17 Jan 85 (date) (time)

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 22 Jan 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 0-40'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 40-60'

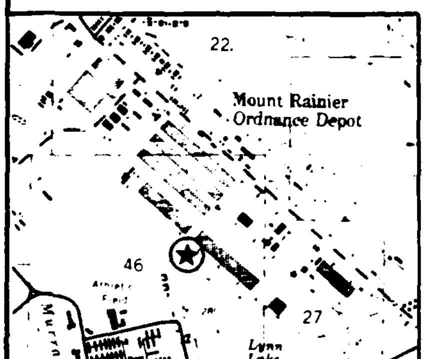
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet east of the Madigan Gate on South "L" Street at the Fort Lewis Logistics Center

Lambert Coordinates: 654118.11N, 1492800.02E

Latitude:

Longitude:

Twp: 19N **Rge:** 2E **Sec:** NE¼ NW¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT	Logistics Center, Fort Lewis, WA (USCOE 1345-04)	**LOCATION**	Fort Lewis, Washington
WELL ID	LC-8	**DATE**	17-22 Jan 85
SURFACE ELEVATION	287.2	**GROUNDWATER ELEVATION**	256.74 (26 Jul 85)

ELEV	DEPTH	GEOLOGIC DESCRIPTION
		0-24 Loose, moist to wet, slightly silty, sandy gravel, locally very cobbly. Color fines varies from dark grayish-brown to olive
277.2	10	
267.2	20	
		24-38 Medium dense to very dense, saturated, slightly silty to silty, very gravelly fine sand to sandy gravel. Color of fines is olive gray.
257.2	30	
		38-46 Hard, moist to saturated, very gravelly silt to silty, very gravelly, fine sand. Color of fines is dark grayish-brown.
247.2	40	
		46-60 Very dense, saturated, interbedded fine to medium sand and gravelly sand to sandy gravel, locally silty. Color of fines varies from dark greenish-gray to olive brown.
237.2	50	
227.2	60	60' Total Depth

GRAPHIC LOG — SAMPLES — GROUND WATER: 7/26 — STANDARD PENETRATION RESISTANCE

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-9

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

Land Surface: 286.2

Top of Casing: 288.78

Groundwater: 258.95 (26 Jul 85)

Drilling Started: 23 Jan 85 (date) (time)

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 28 Jan 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 0-55'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" **ID** 4.50" **OD**

Depth: 55-60'

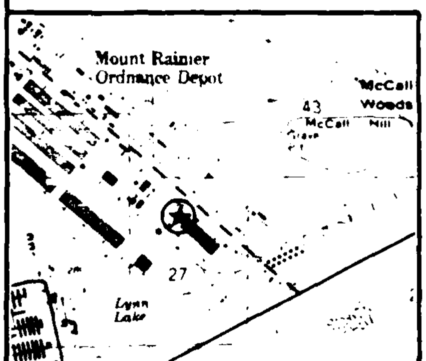
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet southeast of South "O" Street in the parking lot in front of warehouse Bldg. 9670.

Lambert Coordinates: 654183.71N, 1494778.91E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-9 **DATE:** 23-28 Jan 85

SURFACE ELEVATION: 286.2 **GROUNDWATER ELEVATION:** 258.95 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-43 Loose to very dense, wet to saturated, sandy to very sandy gravel, locally cobbly or slightly silty. Color of fines varies from dark olive gray to greenish-gray.			
276.2	10					
266.2	20					
256.2	30				7/26	
246.2	40		43-53 Medium dense, moist, silty to very silty, fine sand. Color is dark gray.			
236.2	50		53-61 Medium dense to very dense, saturated, interbedded sandy gravel and medium sand, locally silty. Color of fines is dark greenish-gray.			
226.2	60		61' Total Depth			
216.2	70					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-10

DRILLING SUMMARY

Total Depth: 40'

Borehole Diameter: 6"

ELEVATION

- **Land Surface:** 286.2
- **Top of Casing:** 288.81
- **Groundwater:** 258.99 (26 Jul 85)

Drilling Started: 29 Jan 85 (date) (time)

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 30 Jan 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 4" **ID** 4.50" **OD**
- **Depth:** 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

- **Material:** PVC Sch. 40
- **Diameter:** 4" **ID** 4.50" **OD**
- **Depth:** 20-40'

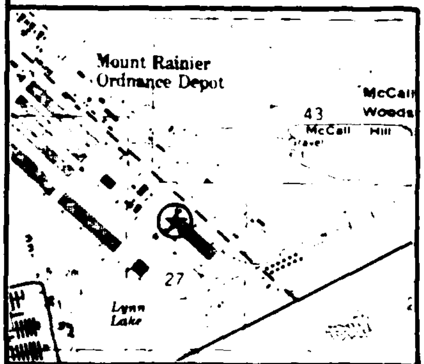
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet southeast of South "O" Street in the parking lot in front of warehouse Bldg. 9670.

Lambert Coordinates: 654178.85N, 1494782.46E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-10 **DATE:** 29-30 Jan 85

SURFACE ELEVATION: 286.2 **GROUNDWATER ELEVATION:** 258.99 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-40 Loose to very dense, wet to saturated, sandy to very sandy gravel, locally cobbly or slightly silty. Color of fines varies from dark olive gray to greenish-gray.			
276.2	10					
266.2	20					
					7/26	
256.2	30					
246.2	40		40' Total Depth			

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-11

DRILLING SUMMARY

Total Depth: 60'

Borehole Diameter: 6"

ELEVATION

Land Surface: 287.3

Top of Casing: 289.69

Groundwater: 260.34 (26 Jul 85)

Drilling Started: 4 Feb 85 (date) (time)

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 11 Feb 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 20-60'

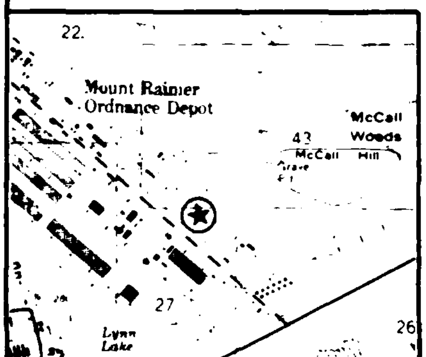
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet east of the intersection of North "O" Street and Benton Ave. at the Fort Lewis Logistics Center.

Lambert Coordinates: 654751.76N, 1495289.35E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1345-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC-11	**DATE:**	4-11 Feb 85
SURFACE ELEVATION:	287.3	**GROUNDWATER ELEVATION:**	260.34 (26 Jul 85)

ELEV	DEPTH	GEOLOGIC DESCRIPTION	GROUND WATER
		0-60 Loose to very dense, moist to saturated, very gravelly sand to slightly sandy gravel. Locally cobbly and slightly silty. Color of fines varies from olive gray to yellowish-brown.	
277.3	10		
267.3	20		
			7/26
257.3	30		
247.3	40		
237.3	50		
227.3	60	60' Total Depth	

Columns: GRAPHIC LOG, SAMPLES, STANDARD PENETRATION RESISTANCE

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-12

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

Land Surface: 276.4

Top of Casing: 278.84

Groundwater: 248.39 (26 Jul 85)

Drilling Started: 12 Feb 85 (date) (time)

Geologist:

NOTES:

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 26 Feb 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

Material: PVC Sch. 40

Diameter: 4" ID 4.50" OD

Depth: 20-60'

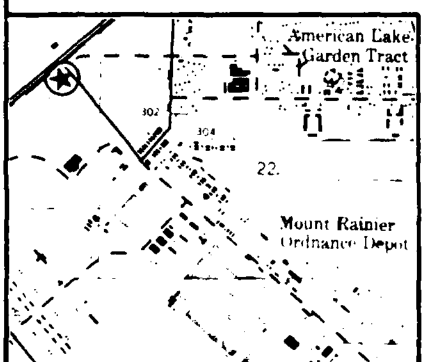
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet south of the cobblestone gate monument at the west end of Rainier Drive on the east site of I-5 at the Fort Lewis Logistics Center.

Lambert Coordinates: 659054.09N, 1490086.72E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ NE¼ 21

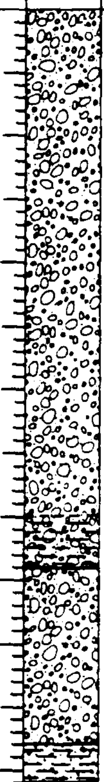
Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04)
LOCATION: Fort Lewis, Washington

WELL ID: LC-12
DATE: 12-26 Feb 85

SURFACE ELEVATION: 276.4
GROUNDWATER ELEVATION: 248.39 (26 Jul 85)



ELEV	DEPTH	GEOLOGIC DESCRIPTION
		0-40 Very loose to very dense, moist to saturated, slightly sandy to very sandy gravel, locally slightly silty to silty. Color of fines generally olive gray to light olive brown.
266.4	10	
256.4	20	
246.4	30	
236.4	40	40-44 Very loose to very dense, moist to saturated slightly silty to silty.
		44-58 Loose to very dense, saturated, interbedded, slightly gravelly to gravelly sand and slightly sandy gravel.
226.4	50	
		58-61 Medium stiff, wet, slightly clayey silt with trace of coarse gravel. Color of fines is greenish gray to olive.
216.4	60	61' Total Depth
206.4	70	

GROUND WATER: 7/26

STANDARD PENETRATION RESISTANCE

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-13

DRILLING SUMMARY

Total Depth: 61'

Borehole Diameter: 6"

ELEVATION

- **Land Surface:** 277.3
- **Top of Casing:** 279.93
- **Groundwater:** 249.98 (26 Jul 85)

Drilling Started: 27 Feb 85 (date) (time)

Geologist:

NOTES:

Driller: Richardson Drilling
Tacoma, WA

Rig Type: 71 Speedstar Cable Tool

Bit(s):

Drilling Fluid:

Drilling Completed: 4 Mar 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 4" ID 4.50" OD
- **Depth:** 0-20'

JOINTS: (type) Threaded

Filter Material: Pea Gravel/Native Backfill

SLOTTED CASING

- **Material:** PVC Sch. 40
- **Diameter:** 4" ID 4.50" OD
- **Depth:** 20-60'

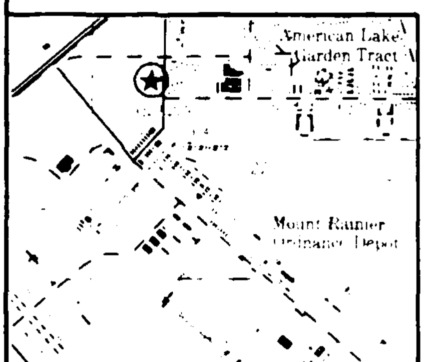
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet west of Murray Road, approximately 200 feet north of the intersection of Murray Road and 150th Street S.W. on the Woodbrook Vocational Center grounds.

Lambert Coordinates: 658940.15N, 1491704.48E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ NW¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1345-04)

LOCATION: Fort Lewis, Washington

WELL ID: LC-13

DATE: 27 Feb - 4 Mar 85

SURFACE ELEVATION: 277.3

GROUNDWATER ELEVATION: 249.98 (26 Jul 85)

ELEV	DEPTH	GEOLOGIC DESCRIPTION	GROUND WATER
		0-18 Loose to medium dense, wet, sandy gravel, trace silt. Color of fines is olive mottled with dark greenish gray and olive yellow.	
267.3	10		
257.3	20	18-22 Loose, wet, slightly sandy, very gravelly cobbles, trace silt. Color of fines is olive mottled dark brown.	
		22-27 Loose, saturated, very sandy gravel, trace silt. Color of fines is pale olive.	7/26
247.3	30	27-46 Medium dense to very dense, saturated slightly gravelly sand to very sandy gravel, trace silt. Color of fines is olive gray.	
237.3	40		
		46-61 Very loose to loose, saturated, interbedded medium to coarse sand and sandy, fine gravel.	
227.3	50		
217.3	60	61' Total Depth	
207.3	70		

Columns: ELEV | DEPTH | GRAPHIC LOG | GEOLOGIC DESCRIPTION | SAMPLES | GROUND WATER | STANDARD PENETRATION RESISTANCE

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-14

DRILLING SUMMARY

Total Depth: 60'

Borehole Diameter: 8"

ELEVATION

- **Land Surface:**
- **Top of Casing:**
- **Groundwater:**

Drilling Started: 19 Mar 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 25 Mar 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" **ID** 2.375" **OD**
- **Depth:** 0-34'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" **ID** 2.375" **OD**
- **Depth:** 34-59'

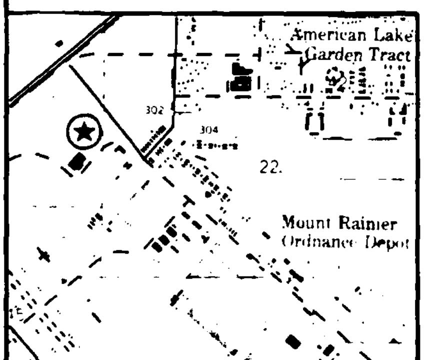
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument:

NOTES: Casing plugged with bentonite.

SITE DESCRIPTION



Site Sketch

Location: Approximately 800 feet due south of the cobblestone gate monument at the west end of Rainier Ave., in the woods at the Fort Lewis Logistics Center.

Lambert Coordinates: 658352.99N, 1489556.95E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NE¼ 21

Boring log and field notes for LC-14 were not supplied to SAIC by USCOE. It was reported that LC-14 was inadvertently plugged with bentonite during construction of the monitoring well.

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-15

DRILLING SUMMARY

Total Depth: 60'

Borehole Diameter: 8"

ELEVATION

Land Surface: 271.5

Top of Casing: 272.91

Groundwater: 249.31 (26 Jul 85)

Drilling Started: 25 Mar 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 26 Mar 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 0-19'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 19-60'

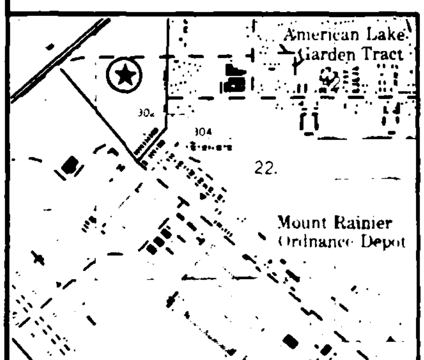
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. X 5' Steel with locking cover

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 875 feet west of Murray Road, south of dirt access road, in the woods at the Woodbrook Vocational Center.

Lambert Coordinates: 659037.80N, 1491097.80E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ NW¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-15 **DATE:** 19-25 Mar 85

SURFACE ELEVATION: 271.5 **GROUNDWATER ELEVATION:** 249.31 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-60 Sandy gravel, occasional cobbles, medium, moist, brown, grading to dark gray, wet.			
261.5	10					
251.5	20				7/26	
241.5	30					
231.5	40					
221.5	50					
211.5	60		60' Total Depth			
201.5	70					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-16

DRILLING SUMMARY

Total Depth: 59'

Borehole Diameter: 8"

ELEVATION

Land Surface: 265.5

Top of Casing: 266.88

Groundwater: 249.84 (26 Jul 85)

Drilling Started: 3 Apr 85
(date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers
Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed:
(date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 20-59'

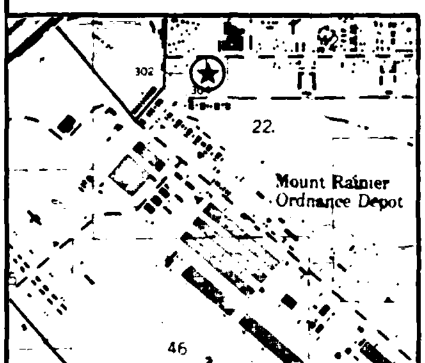
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 100 feet north of Fort Lewis security fence, south of 150th Street S.W., on small parcel of Army property which extends northward into southwest corner of American Lake Garden Tract.
Lambert Coordinates: 658295.85N, 1492472.27E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NW¼ 22

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION**	Fort Lewis, Washington
WELL ID	LC-16	**DATE**	25-26 Mar 85
SURFACE ELEVATION	265.5	**GROUNDWATER ELEVATION**	249.84 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-14 Silty gravel, with minor sand, cobbles, dense, damp to wet, brown.			
255.5	10					
			14-18 Sandy gravel with cobbles, dense, wet, brown.		7/26	
245.5	20		18-22 Silty sandy gravel with cobbles, dense, wet, brown.			
			22-27 Sand, medium to coarse with small gravels, medium, wet, gray.			
235.5	30		27-59 Sandy gravel with minor silt, very dense, wet, gray to tan.			
225.5	40					
215.5	50					
205.5	60		59' Total Depth			

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-17

DRILLING SUMMARY

Total Depth: 59'

Borehole Diameter: 8"

ELEVATION

Land Surface: 289.9

Top of Casing: 291.34

Groundwater: 261.64 (26 Jul 85)

Drilling Started: 3 Apr 85 (date) (time)

Geologist:

NOTES:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: (date) (time)

Technician:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 20-40'

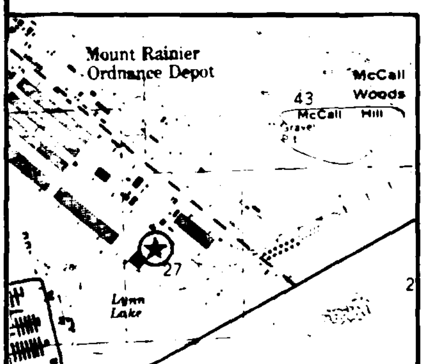
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 375 feet due south of Bldg. 9671, in the parking area northeast of warehouse Bldg. 9669, at the Fort Lewis Logistics Center.

Lambert Coordinates: 653475.24N, 1494543.70E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SW¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC17	**DATE:**	3 Apr 85
SURFACE ELEVATION:	289.9	**GROUNDWATER ELEVATION:**	261.64 (26 Jul 85)

ELEV	DEPTH
279.9	10
269.9	20
259.9	30
249.9	40
239.9	50
229.9	60

GRAPHIC LOG

GEOLOGIC DESCRIPTION

0-2.5 Silty sandy gravel with cobbles, dense, moist, dark brown to black.

2.5-22 Sandy gravel with some cobbles, dense, moist, brown.

22-59 Silty sandy gravel with some cobbles, medium to coarse, dense, wet, tan to brown grading to gray.

59' Total Depth

SAMPLES

GROUND WATER

7/26

STANDARD PENETRATION RESISTANCE

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-18

DRILLING SUMMARY

Total Depth: 59'

Borehole Diameter: 8"

ELEVATION

Land Surface: 282.5

Top of Casing: 283.94

Groundwater: 261.54 (26 Jul 85)

Drilling Started: 28 Mar 85 (date) (time)

Geologist:

NOTES:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 2 Apr 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 0-32'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 32-42'

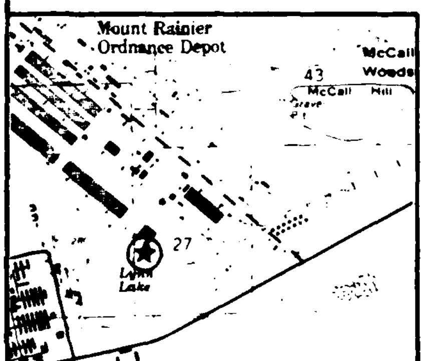
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 250 feet south of warehouse Bldg. 9669 in grassy area at intersection of DMRO storage yard fence and Logistics Center/Madigan Army Medical Center boundary fence.

Lambert Coordinates: 653005.15N, 1494114.69E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SW¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

— BORING LOG —

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-18 **DATE:** 28 Mar - 2 Apr 85

SURFACE ELEVATION: 282.5 **GROUNDWATER ELEVATION:** 261.54 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-11 Silty gravel, medium, dense, moist, black.			
272.5	10		11-22 Sandy gravel with occasional cobbles, dense, moist, brown, fairly clean.			
262.5	20		22-28 Sand, coarse to medium, moist to wet, brown to gray.		7/26	
252.5	30		28-59 Silty sandy gravel, very dense, moist, gray.			
242.5	40					
232.5	50					
222.5	60		59' Total Depth			

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-19A

DRILLING SUMMARY

Total Depth: 79'

Borehole Diameter: 8"

ELEVATION

- **Land Surface:** 289.2
- **Top of Casing:** 290.53
- **Groundwater:** 262.54 (26 Jul 85)

Drilling Started: 4 Apr 85 (date) (time)

Geologist:

NOTES:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 8 Apr 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:** 0-65'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:** 65-75'

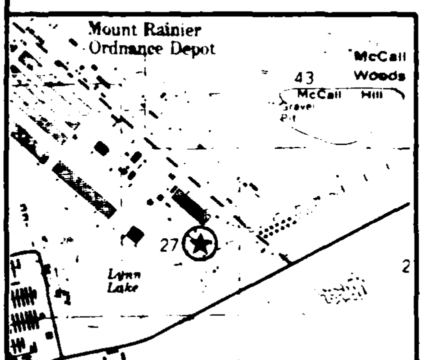
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet east of the intersection of Cook Ave. and South "O" Street at the Fort Lewis Logistics Center.

Lambert Coordinates: 653095.28N, 1495139.24E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

—— BORING LOG ——

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID	LC-19A	**DATE:**	4-8 Apr 85
SURFACE ELEVATION:	289.2	**GROUNDWATER ELEVATION**	262.54 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-2 Silty sandy gravel, medium, moist, black, organic.			
			2-24 Sandy gravel with cobbles, dense, moist, brown.			
279.2	10					
269.2	20					
			24-79 Silty sandy gravel, coarse, dense, wet, gray to brown.		7/26	
259.2	30					
249.2	40					
239.2	50					
229.2	60					
219.2	70					
209.2	80		79' Total Depth			

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-19B

DRILLING SUMMARY

Total Depth: 56.5'

Borehole Diameter: 8"

ELEVATION

- **Land Surface:** 289.2
- **Top of Casing:** 290.70
- **Groundwater:** 262.07 (26 Jul 85)

Drilling Started: 8 Apr 85 (date) (time)

Geologist:

NOTES:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 9 Apr 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:** 0-45'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:** 45-55'

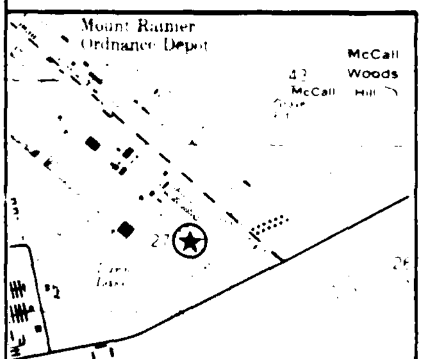
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet east of the intersection of Cook Ave. and South "O" Street at the Fort Lewis Logistics Center.

Lambert Coordinates: 653092.58N, 1495135.01E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04)

LOCATION: Fort Lewis, Washington

WELL ID: LC-19B

DATE: 8-9 Apr 85

SURFACE ELEVATION: 289.2

GROUNDWATER ELEVATION: 262.07 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-2 Silty sandy gravel, medium, moist, black, organic.			
			2-24 Sandy gravel with cobbles, dense, moist, brown.			
279.2	10					
269.2	20					
			24-56.5 Silty sandy gravel, coarse, dense, wet, gray to brown.		7/26	
259.2	30					
249.2	40					
239.2	50					
			56.5' Total Depth			
229.2	60					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-19C

DRILLING SUMMARY

Total Depth: 35'

Borehole Diameter: 8"

ELEVATION

Land Surface: 289.2

Top of Casing: 290.48

Groundwater: 261.80 (26 Jul 85)

Drilling Started: 11 Apr 85 (date) (time)

Geologist:

NOTES:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 12 Apr 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 0-25'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 25-35'

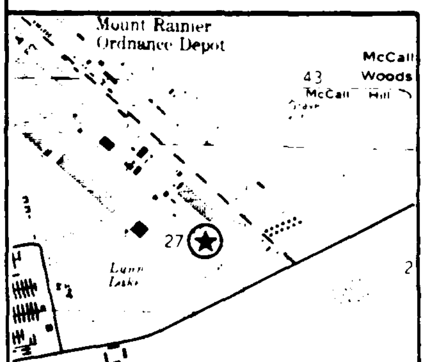
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet east of the intersection of Cook Ave. and South "O" Street at the Fort Lewis Logistics Center.

Lambert Coordinates: 653099.01N, 145137.78E

Latitude: Longitude:

Twp: 19N Rge: 2E Sec: SE¼ NE¼ 27

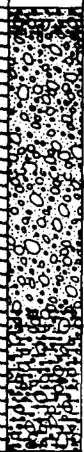
Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-19C **DATE:** 11-12 Apr 85

SURFACE ELEVATION: 289.2 **GROUNDWATER ELEVATION:** 261.80 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-2 Silty sandy gravel, medium, moist, black, organic.			
			2-24 Sandy gravel with cobbles, dense, moist, brown.			
279.2	10					
269.2	20					
			24-35 Silty sandy gravel, coarse, dense, wet, gray to brown.		7/26	
259.2	30					
			35' Total Depth			
249.2	40					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-20

DRILLING SUMMARY

Total Depth: 47.5'

Borehole Diameter: 8"

ELEVATION

- **Land Surface:** 289.6
- **Top of Casing:** 290.85
- **Groundwater:** 261.63 (26 Jul 85)

Drilling Started: 12 Apr 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 15 Apr 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:**

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:**

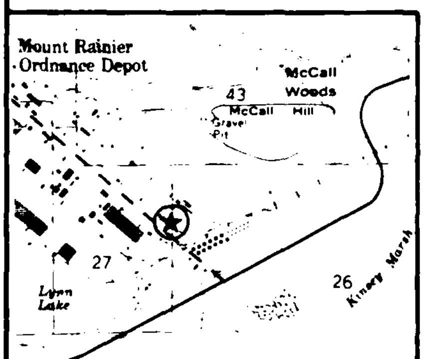
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES: Casing and screen depths not reported to SAIC.

SITE DESCRIPTION



Site Sketch

Location: Approximately 150 feet north of intersection of Rainier Drive and North "O" Street on east side of North "O" Street at Fort Lewis Logistics Center.

Lambert Coordinates: 653851.53N, 1495823.49E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SE¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

—— BORING LOG ——

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC-20	**DATE:**	12-15 Apr 85
SURFACE ELEVATION:	289.6	**GROUNDWATER ELEVATION:**	261.63 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-36.5 Silty sandy gravel to silty sand with gravel, occasional cobbles, dense, moist, black grading to brown.			
279.6	10					
269.6	20					
					7/26	
259.6	30					
			36.5-46 Gravelly sand with scattered cobbles, medium, dense, wet, brown.			
249.6	40					
			46-47.5 Sandy silty gravel, dense, wet, gray.			
			47.5' Total Depth			
239.6	50					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-21

DRILLING SUMMARY

Total Depth: 42'

Borehole Diameter: 8"

ELEVATION

Land Surface: 279.2

Top of Casing: 280.22

Groundwater: 267.02 (26 Jul 85)

Drilling Started: 16 Apr 85 (date) (time)

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 16 Apr 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth:

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth:

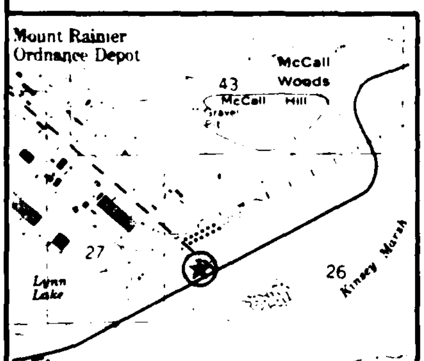
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES: Casing and screen depths not reported to SAIC.

SITE DESCRIPTION



Site Sketch

Location: Approximately 25 feet west of intersection of Rainier Drive and East Lincoln Drive at the Fort Lewis Logistics Center.

Lambert Coordinates: 652765.03N, 1496443.81E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** SW¼ NW¼ 26

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC-21	**DATE:**	16 Apr 85
SURFACE ELEVATION:	279.2	**GROUNDWATER ELEVATION:**	267.02 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-9 Silty sandy gravel with scattered cobbles occasional boulders, organic debris at surface, dense, moist to wet, light gray to light brown.			
269.2	10		9-20 Sandy gravel, some silt, scattered cobbles, loose, wet, light brown to light gray.		7/26	
259.2	20		20-42 Silty sandy gravel with scattered cobbles, loose, wet, light gray to blue gray.			
249.2	30					
239.2	40					
			42' Total Depth			
229.2	50					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) Well ID: LC-22

DRILLING SUMMARY

Total Depth: 52.5'

Borehole Diameter: 8"

ELEVATION

Land Surface: 296.1

Top of Casing: 297.60

Groundwater: 260.03 (26 Jul 85)

Drilling Started: 19 Apr 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 22 Apr 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 0-33'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 33-48'

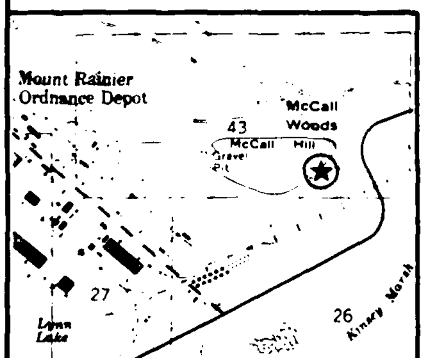
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 1,000 feet west of intersection of railroad tracks and East Lincoln Drive just off the southeast flank of McCall Hill at the Fort Lewis Logistics Center.

Lambert Coordinates: 655281.84N, 1497011.38E

Latitude:

Longitude:

Twp: 19N Rge: 2E Sec: NE¼ NW¼ 26

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION**	Fort Lewis, Washington
WELL ID	LC-22	**DATE**	19-22 Apr 85
SURFACE ELEVATION	296.1	**GROUNDWATER ELEVATION**	260.03 (26 Jul 85)

ELEV	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-2.5 Silty gravel with some cobbles, medium, moist, black.			
			2.5-17 Sandy gravel with occasional cobbles, dense, moist brown to gray.			
286.1	10					
			17-21 Sand, fine to medium, loose moist, brown to gray.			
276.1	20					
			21-52.5 Silty sandy gravel with occasional cobbles, medium to dense.			
266.1	30					
					7/26	
256.1	40					
246.1	50					
			52.5 Total Depth			
236.1	60					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-23

DRILLING SUMMARY

Total Depth: 46.5'

Borehole Diameter: 8"

ELEVATION

Land Surface: 280.5

Top of Casing: 281.91

Groundwater: 267.53 (26 Jul 85)

Drilling Started: 22 Apr 85 (date) (time)

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 23 Apr 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 0-25'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 25-45'

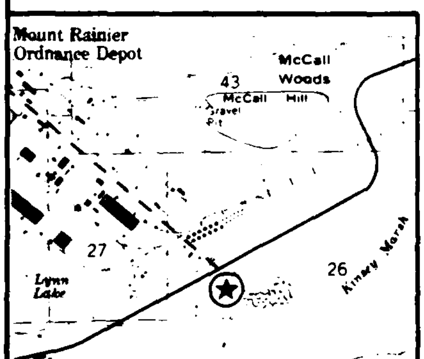
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 250 feet southeast of the intersection of Rainier Drive and East Lincoln Road on the south side of the dirt road leading to Fort Lewis Landfill No. 2.

Lambert Coordinates: 652461.67N, 1496851.45E

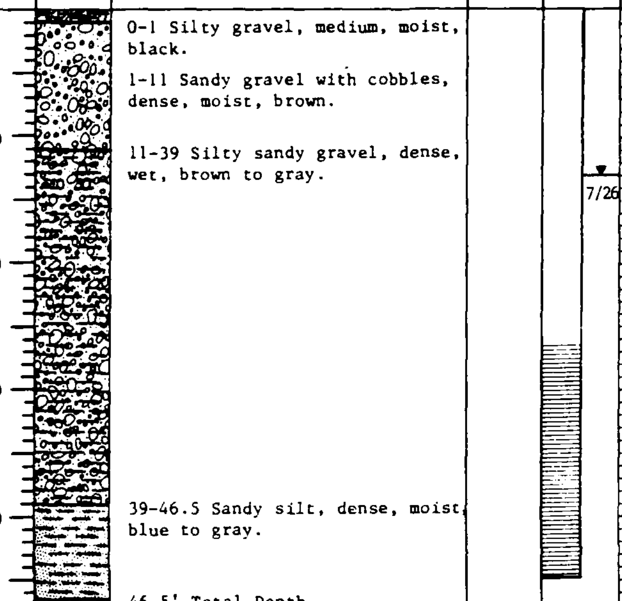
Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ SW¼ 26

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	LOCATION:	Fort Lewis, Washington
WELL ID	LC-23	DATE:	22-23 Apr 85
SURFACE ELEVATION:	280.5	GROUNDWATER ELEVATION:	267.53 (26 Jul 85)



ELEV.	DEPTH	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
		0-1 Silty gravel, medium, moist, black.			
		1-11 Sandy gravel with cobbles, dense, moist, brown.			
270.5	10	11-39 Silty sandy gravel, dense, wet, brown to gray.		7/26	
260.5	20				
250.5	30				
240.5	40	39-46.5 Sandy silt, dense, moist, blue to gray.			
		46.5' Total Depth			
230.5	50				

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-24

DRILLING SUMMARY

Total Depth: 47'

Borehole Diameter: 8"

ELEVATION

- **Land Surface:** 285.4
- **Top of Casing:** 286.68
- **Groundwater:** 267.71 (26 Jul 85)

Drilling Started: 24 Apr 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 24 Apr 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" **ID** 2.375" **OD**
- **Depth:** 0-26'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" **ID** 2.375" **OD**
- **Depth:** 26-46'

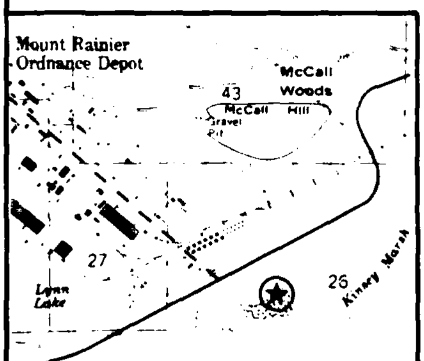
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 500 feet south of East Lincoln Road at the northeast corner of boundary fence of Fort Lewis Landfill No. 2.

Lambert Coordinates: 652818.82N, 1497577.01E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ SW¼ 26

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

—— BORING LOG ——

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-24 **DATE:** 24 Apr 85

SURFACE ELEVATION: 285.4 **GROUNDWATER ELEVATION:** 267.71 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-1.5 Silty gravel, medium, moist, black.			
			1.5-13 Sandy gravel, dense, moist, brown.			
275.4	10					
			13-19 Silty sandy gravel, dense, damp to wet, brown to gray.			
265.4	20		19-25 Sandy gravel, medium to dense, wet, gray.		7/26	
			25-43 Silty sandy gravel, dense, wet, brown.			
255.4	30					
245.4	40					
			43-47 Sandy silt, very dense, moist, brown to gray.			
			47' Total Depth			
235.4	50					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-25

DRILLING SUMMARY

Total Depth: 27'

Borehole Diameter: 8"

ELEVATION

Land Surface: 274.6

Top of Casing: 275.91

Groundwater: 264.92 (26 Jul 85)

Drilling Started: 25 Apr 85 (date) (time)

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 25 Apr 85 (date) (time)

Geologist:

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 0-12'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 12-27'

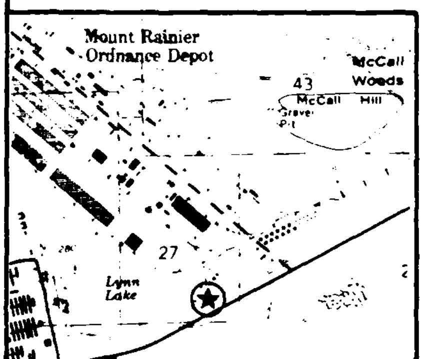
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 50 feet north of East Lincoln Road, approximately 300 feet east of southwest corner of Fort Lewis Logistics Center boundary fence.

Lambert Coordinates: 652009.12N, 149069.53E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ SE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

BORING LOG

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC-25	**DATE:**	25 Apr 85
SURFACE ELEVATION:	274.6	**GROUNDWATER ELEVATION:**	264.92 (26 Jul 85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-1.5 Silty gravel with cobbles, dense, moist black.			
			1.5-18 Sandy gravel with numerous cobbles, dense, moist brown			
264.6	10				7/26	
			18-23 Silty sandy gravel, very dense, wet brown.			
254.6	20					
			23-27 Sandy silt with some small gravel, very dense, moist to dry gray.			
			27' Total Depth			
244.6	30					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-26

DRILLING SUMMARY

Total Depth: 36.5'

Borehole Diameter: 8"

ELEVATION

Land Surface: 275.8

Top of Casing: 277.11

Groundwater:

Drilling Started: 25 Apr 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers
Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 26 Apr 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 0-11'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" **ID** 2.375" **OD**

Depth: 11-36'

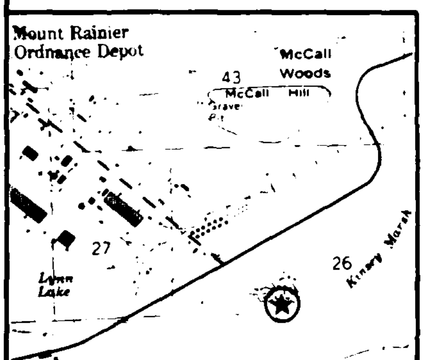
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 1100 feet southeast of the intersection of Rainier Drive and East Lincoln Road along the southeast (back) boundary fence of Fort Lewis Landfill No. 2.

Lambert Coordinates: 651894.94N, 1497562.65E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ SW¼ 26

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers

— BORING LOG —

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04) **LOCATION:** Fort Lewis, Washington

WELL ID: LC-26 **DATE:** 25-26 Apr 85

SURFACE ELEVATION: 275.8 **GROUNDWATER ELEVATION:**

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-6 Silty gravel with some large cobbles, medium to dense, moist, black.			
			6-13 Sandy gravel with some silt, medium to dense, wet, brown.			
265.8	10					
			13-36.5 Silty sandy gravel, dense, wet, brown.			
255.8	20					
245.8	30					
			36.5' Total Depth			
235.8	40					

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-27

DRILLING SUMMARY

Total Depth: 42.5'

Borehole Diameter: 8"

ELEVATION

Land Surface: 278.3

Top of Casing: 279.54

Groundwater:

Drilling Started: 2 May 85 (date) (time)

Geologist:

NOTES:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 2 May 85 (date) (time)

Technician:

WELL DESIGN

BLANK CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 0-20'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

Material: PVC - Sch. 40

Diameter: 2" ID 2.375" OD

Depth: 20-30'

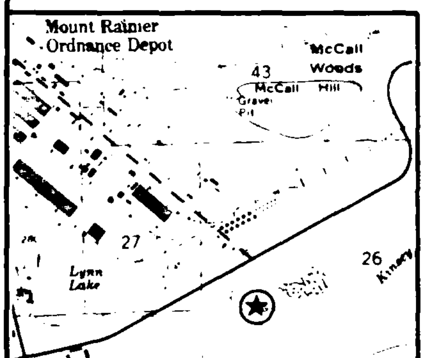
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 850 feet south of the intersection of Rainier Drive and East Lincoln Road, approximately 250 feet west of west boundary fence of Fort Lewis Landfill No. 2.

Lambert Coordinates: 651871.02N, 1496424.93E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NE¼ SW¼ 26

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

BORING LOG

PROJECT: Logistics Center, Fort Lewis, WA (USCOE 1234-04)

LOCATION: Fort Lewis, Washington

WELL ID: LC-27

DATE: 2 May 85

SURFACE ELEVATION: 278.3

GROUNDWATER ELEVATION:

ELEV.	DEPTH	GEOLOGIC DESCRIPTION
		0-1.5 Silty gravel, medium, moist, black.
		1.5-24 Sandy gravel with large cobbles, dense, moist, brown.
268.3	10	
258.3	20	
		24-42.5 Silty sandy gravel, dense, wet, tan to gray.
248.3	30	
238.3	40	
		42.5' Total Depth
228.3	50	

WELL CONSTRUCTION SUMMARY

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

Project: Logistics Center, Fort Lewis, WA (USCOE 1345-04) **Well ID:** LC-28

DRILLING SUMMARY

Total Depth: 22'

Borehole Diameter: 8"

ELEVATION

- **Land Surface:** 283.8
- **Top of Casing:** 285.82
- **Groundwater:** 265.20 (8/20/85)

Drilling Started: 3 May 85 (date) (time)

Geologist:

Driller: U.S. Army Corps of Engineers Seattle District

Rig Type: Mobile B-80 Hollow Stem Auger

Bit(s):

Drilling Fluid:

Drilling Completed: 6 May 85 (date) (time)

Technician:

NOTES:

WELL DESIGN

BLANK CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:** 0-12'

JOINTS: (type) Threaded

Filter Material: Native Backfill

SLOTTED CASING

- **Material:** PVC - Sch. 40
- **Diameter:** 2" ID 2.375" OD
- **Depth:** 12-22'

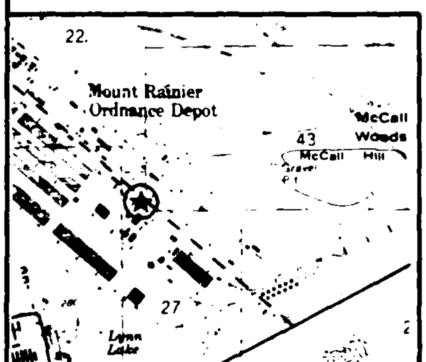
JOINTS: (type) Threaded

GROUT: (type) Cement/Bentonite

Surface Monument: 6" I.D. x 5' Steel with locking cover.

NOTES:

SITE DESCRIPTION



Site Sketch

Location: Approximately 30 feet south of Rainier Drive, approximately 150 feet north of Bldg. 9646 at the Fort Lewis Logistics Center.

Lambert Coordinates: 654896.52 N, 1494185.69 E

Latitude: **Longitude:**

Twp: 19N **Rge:** 2E **Sec:** NW¼ NE¼ 27

Prepared by SAIC with information provided by the Seattle District, U.S. Army Corps of Engineers.

— BORING LOG —

PROJECT:	Logistics Center, Fort Lewis, WA (USCOE 1234-04)	**LOCATION:**	Fort Lewis, Washington
WELL ID:	LC-28	**DATE:**	3-6 May 85
SURFACE ELEVATION:	283.8	**GROUNDWATER ELEVATION:**	265.20 (8/20/85)

ELEV.	DEPTH	GRAPHIC LOG	GEOLOGIC DESCRIPTION	SAMPLES	GROUND WATER	STANDARD PENETRATION RESISTANCE
			0-5 Silty gravel with organic matter, dense, moist, black.			
			5-22 Silty sandy gravel, dense, moist to damp, tan to gray.			
273.8	10					
263.8	20					
			22' Total Depth			
253.8	30					

APPENDIX E

IN SITU MONITORING WELL AND OTHER FIELD DATA

NOTE: The right hand column marked "VOC" indicates whether groundwater sample was collected on the date indicated ("T" = yes, "F" = no) and the sample analyzed for volatile organic chemicals. The results of the analyses may be found in Appendix F.4.

Well # AZ02_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
1	07/26/85	50.48	257.88				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	50.48	50.48	07/26	50.48	07/26
Water Level (MSL)	1	257.88	257.88	07/26	257.88	07/26

Well # AZ03_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
2	07/26/85	39.38	257.34				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	39.38	39.38	07/26	39.38	07/26
Water Level (MSL)	1	257.34	257.34	07/26	257.34	07/26

Well # AZ07_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
3	06/03/85	23.61	260.25	6.95	NA	13.0	.T.
4	06/10/85	23.82	260.04	NA	183	15.2	.T.
5	06/17/85	23.93	259.93	6.90	163	13.2	.T.
6	06/24/85	24.16	259.70	6.93	174	11.7	.T.
7	07/01/85	24.48	259.38				.F.
8	07/08/85	24.85	259.01	7.22	NA	15.7	.T.
9	07/12/85			7.50	187	NA	.T.
10	07/18/85	25.37	258.49				.F.
11	07/25/85	25.68	258.18				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	24.49	25.68	07/25	23.61	06/03
Water Level (MSL)	8	259.37	258.18	07/25	260.25	06/03
pH	5	na	6.90	06/17	7.50	07/12
Conductivity	4	172	163	06/17	187	07/12
Temperature	5	13.8	11.7	06/24	15.7	07/08

Well # AZ08_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
12	06/03/85	20.57	260.67	6.23	165	13.2	.T.
13	06/10/85	20.63	260.61	NA	168	15.4	.T.
14	06/17/85	20.95	260.29	6.31	167	16.0	.T.
15	06/24/85	21.13	260.11	6.11	168	13.4	.T.
16	07/01/85	22.32	258.92				.F.
17	07/08/85	21.65	259.59	7.60	NA	19.7	.T.
18	07/18/85	22.01	259.23				.F.
19	07/26/85	22.17	259.07				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	21.43	22.32	07/01	20.57	06/03
Water Level (MSL)	8	259.81	258.92	07/01	260.67	06/03
pH	4	na	6.11	06/24	7.60	07/08
Conductivity	4	167	165	06/03	168	06/10
Temperature	5	15.5	13.2	06/03	19.7	07/08

Well # AZ09_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
20	06/03/85	21.66	260.46	6.59	NA	13.1	.T.
21	06/10/85	21.66	260.46	NA	156	14.4	.T.
22	06/17/85	21.83	260.29	7.11	153	15.1	.T.
23	06/24/85	22.06	260.06	6.80	163	12.8	.T.
24	07/01/85	21.35	260.77				.F.
25	07/08/85	22.60	259.52	7.20	NA	16.8	.T.
26	07/12/85			7.60	135	NA	.T.
27	07/18/85	23.03	259.09				.F.
28	07/26/85	23.21	258.91				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	22.18	23.21	07/26	21.35	07/01
Water Level (MSL)	8	259.94	258.91	07/26	260.77	07/01
pH	5	na	6.59	06/03	7.60	07/12
Conductivity	4	152	135	07/12	163	06/24
Temperature	5	14.4	12.8	06/24	16.8	07/08

Well # A209_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
29	06/10/85	NA	NA	NA	148	12.8	.T.
30	06/17/85	NA	NA	7.09	175	13.5	.T.
31	06/24/85	NA	NA	6.82	156	12.0	.T.
32	07/08/85	NA	NA	7.20	NA	13.8	.T.
33	07/12/85	NA	NA	7.60	146	NA	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	4	na	6.82	06/24	7.60	07/12
Conductivity	4	159	146	07/12	175	06/17
Temperature	4	13.0	12.0	06/24	13.8	07/08

Well # DR01_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
34	06/03/85	NA	NA	NA	NA	12.0	.T.
35	06/17/85	17.54	258.40				.F.
36	06/24/85	17.70	258.24	6.33	177	11.3	.T.
37	07/01/85	17.94	258.00				.F.
38	07/08/85	18.25	257.69				.F.
39	07/12/85			7.00	173	11.4	.T.
40	07/18/85	18.81	257.13				.F.
41	07/26/85	19.04	256.90				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	18.21	19.04	07/26	17.54	06/17
Water Level (MSL)	6	257.73	256.90	07/26	258.40	06/17
pH	2	na	6.33	06/24	7.00	07/12
Conductivity	2	175	173	07/12	177	06/24
Temperature	3	11.6	11.3	06/24	12.0	06/03

well # DR02_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
42	06/17/85	26.43	260.55				.F.
43	06/24/85	26.70	260.28	6.50	157	12.4	.T.
44	07/01/85	27.00	259.98				.F.
45	07/08/85	27.47	259.51				.F.
46	07/12/85			6.30	193	11.8	.T.
47	07/18/85	28.04	258.94				.F.
48	07/26/85	28.21	258.77				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	27.31	28.21	07/26	26.43	06/17
Water Level (MSL)	6	259.67	258.77	07/26	260.55	06/17
pH	2	na	6.30	07/12	6.50	06/24
Conductivity	2	175	157	06/24	193	07/12
Temperature	2	12.1	11.8	07/12	12.4	06/24

well # DR03_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
49	06/17/85	23.17	261.22				.F.
50	06/24/85	23.47	260.92				.F.
51	07/01/85	23.74	260.65				.F.
52	07/08/85	24.07	260.32				.F.
53	07/18/85	24.67	259.72				.F.
54	07/26/85	24.95	259.44				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	24.01	24.95	07/26	23.17	06/17
Water Level (MSL)	6	260.38	259.44	07/26	261.22	06/17

well # DR04_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
55	06/17/85	34.84	269.23				.F.
56	06/24/85	35.25	268.82				.F.
57	07/01/85	35.50	268.57				.F.
58	07/08/85	35.75	268.32				.F.
59	07/18/85	36.23	267.84				.F.
60	07/26/85	36.54	267.53				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	35.69	36.54	07/26	34.84	06/17
Water Level (MSL)	6	268.38	267.53	07/26	269.23	06/17

Well # [illegible] Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
61	06/03/85	NA	NA	6.22	NA	[illegible]	.T.
62	06/17/85	12.69	259.54				.F.
63	06/24/85	12.90	259.33	6.53	177	10.3	.T.
64	07/01/85	13.24	258.99				.F.
65	07/08/85	13.49	258.74				.F.
66	07/12/85			6.80	174	11.6	.T.
67	07/18/85	14.15	258.08				.F.
68	07/26/85	14.39	257.84				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	13.48	14.39	07/26	12.69	06/17
Water Level (MSL)	6	258.75	257.84	07/26	259.54	06/17
pH	3	na	6.22	06/03	6.80	07/12
Conductivity	2	175	174	07/12	177	06/24
Temperature	3	11.1	10.3	06/24	11.6	07/12

Well # DZ01_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
69	06/17/85	26.86	261.34				.F.
70	06/24/85	27.14	261.06				.F.
71	07/01/85	27.52	260.68				.F.
72	07/08/85	27.92	260.28				.F.
73	07/18/85	29.28	258.92				.F.
74	07/26/85	28.58	259.62				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	27.88	29.28	07/18	26.86	06/17
Water Level (MSL)	6	260.32	258.92	07/18	261.34	06/17

Well # DZ02_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
75	06/17/85	17.86	260.14				.F.
76	06/24/85	18.16	259.84				.F.
77	07/01/85	18.53	259.47				.F.
78	07/08/85	18.82	259.18				.F.
79	07/18/85	19.46	258.54				.F.
80	07/26/85	19.77	258.23				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	18.77	19.77	07/26	17.86	06/17
Water Level (MSL)	6	259.23	258.23	07/26	260.14	06/17

Well # DZ03_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
81	06/03/85	12.60	258.67	5.49	NA	13.6	.T.
82	06/10/85	12.54	258.73				.F.
83	06/17/85	12.81	258.46				.F.
84	06/24/85	13.00	258.27				.F.
85	07/01/85	13.25	258.02				.F.
86	07/08/85	14.49	256.78				.F.
87	07/18/85	13.87	257.40				.F.
88	07/26/85	14.20	257.07				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	13.35	14.49	07/08	12.54	06/10
Water Level (MSL)	8	257.93	256.78	07/08	258.73	06/10
pH	1	na	5.49	06/03	5.49	06/03
Temperature	1	13.6	13.6	06/03	13.6	06/03

Well # DZ03_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
89	06/03/85	NA	NA	5.49	NA	13.6	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	1	na	5.49	06/03	5.49	06/03
Temperature	1	13.6	13.6	06/03	13.6	06/03

Well # DZ06_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
90	06/03/85	16.66	258.71				.F.
91	06/10/85	16.58	258.79				.F.
92	06/17/85	16.89	258.48				.F.
93	06/24/85	17.08	258.29				.F.
94	07/01/85	17.34	258.03				.F.
95	07/08/85	17.60	257.77				.F.
96	07/18/85	18.06	257.31				.F.
97	07/26/85	18.41	256.96				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	17.33	18.41	07/26	16.58	06/10
Water Level (MSL)	8	258.04	256.96	07/26	258.79	06/10

Well # DZ07_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
98	06/03/85	16.19	258.47	NA	NA	11.9	.T.
99	06/10/85	16.19	258.47				.F.
100	06/17/85	16.39	258.27				.F.
101	06/24/85	16.55	258.11				.F.
102	07/01/85	16.77	257.89				.F.
103	07/08/85	16.95	257.71				.F.
104	07/18/85	17.40	257.26				.F.
105	07/26/85	17.79	256.87				.F.

Parameter	n	mean	Range Low	(date)	Range High	(date)
Depth to Water	8	16.78	17.79	07/26	16.19	06/03
Water Level (MSL)	8	257.88	256.87	07/26	258.47	06/03
Temperature	1	11.9	11.9	06/03	11.9	06/03

Well # DZ08_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
106	06/03/85	14.30	259.61	5.49	NA	12.4	.T.
107	06/10/85	14.50	259.41				.F.
108	06/11/85			NA	159	16.0	.T.
109	06/17/85	14.59	259.32				.F.
110	06/24/85	14.78	259.13				.F.
111	07/01/85	15.02	258.89				.F.
112	07/08/85	15.29	258.62	6.72	NA	14.0	.T.
113	07/14/85			6.62	205	NA	.T.
114	07/16/85			7.00	NA	NA	.T.
115	07/18/85	15.89	258.02				.F.
116	07/26/85	16.11	257.80				.F.

Parameter	n	mean	Range Low	(date)	Range High	(date)
Depth to Water	8	15.05	16.11	07/26	14.30	06/03
Water Level (MSL)	8	258.85	257.80	07/26	259.61	06/03
pH	4	na	5.49	06/03	7.00	07/16
Conductivity	2	182	159	06/11	205	07/14
Temperature	3	14.1	12.4	06/03	16.0	06/11

well # DZ09_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
117	06/03/85	15.85	260.99	NA	NA	12.8	.T.
118	06/10/85	15.78	261.06	NA	305	14.7	.T.
119	06/17/85	16.14	260.70	7.55	305	13.6	.T.
120	06/24/85	16.33	260.51	7.39	295	12.2	.T.
121	07/01/85	16.64	260.20				.F.
122	07/08/85	16.88	259.96	7.80	300	16.8	.T.
123	07/18/85	17.44	259.40				.F.
124	07/26/85	17.91	258.93				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	16.62	17.91	07/26	15.78	06/10
Water Level (MSL)	8	260.22	258.93	07/26	261.06	06/10
pH	3	na	7.39	06/24	7.80	07/08
Conductivity	4	301	295	06/24	305	06/10
Temperature	5	14.1	12.2	06/24	16.8	07/08

well # DZ09_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
125	06/03/85	NA	NA	NA	NA	12.8	.T.
126	06/10/85	NA	NA	NA	260	12.6	.T.
127	06/17/85	NA	NA	NA	NA	NA	.T.
128	06/24/85	NA	NA	7.32	255	11.2	.T.
129	07/08/85	NA	NA	8.00	290	13.4	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	2	na	7.32	06/24	8.00	07/08
Conductivity	3	268	255	06/24	290	07/08
Temperature	4	12.5	11.2	06/24	13.4	07/08

well # DZ10_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
130	06/03/85	9.69	259.96	6.30	NA	13.0	.T.
131	06/10/85	9.86	259.79	NA	149	15.4	.T.
132	06/17/85	10.00	259.65	6.65	150	14.3	.T.
133	06/24/85	10.11	259.54	6.63	166	13.1	.T.
134	07/01/85	10.44	259.21				.F.
135	07/08/85	10.69	258.96	7.30	147	17.8	.T.
136	07/18/85	11.26	258.39				.F.
137	07/26/85	11.64	258.01				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	10.46	11.64	07/26	9.69	06/03
water Level (MSL)	8	259.19	258.01	07/26	259.96	06/03
pH	4	na	6.30	06/03	7.30	07/08
Conductivity	4	153	147	07/08	166	06/24
Temperature	5	14.7	13.0	06/03	17.8	07/08

well # DZ10_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
138	06/03/85	NA	NA	6.30	NA	13.0	.T.
139	06/10/85	NA	NA	NA	144	16.0	.T.
140	06/17/85	NA	NA	6.78	148	12.9	.T.
141	06/24/85	NA	NA	6.79	159	12.1	.T.
142	07/08/85	NA	NA	7.20	147	15.2	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	4	na	6.30	06/03	7.20	07/08
Conductivity	4	150	144	06/10	159	06/24
Temperature	5	13.8	12.1	06/24	16.0	06/10

Well # DZ11_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
143	06/03/85	20.38	259.94	6.40	NA	11.0	.T.
144	06/10/85	21.29	259.03	NA	163	12.3	.T.
145	06/17/85	20.55	259.77	6.20	131	12.7	.T.
146	06/24/85	20.73	259.59	6.70	142	10.8	.T.
147	07/01/85	21.03	259.29				.F.
148	07/08/85	21.32	259.00	6.80	NA	13.0	.T.
149	07/18/85	21.83	258.49				.F.
150	07/26/85	22.19	258.13				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	8	21.16	22.19	07/26	20.38	06/03
Water Level (MSL)	8	259.15	258.13	07/26	259.94	06/03
pH	4	na	6.20	06/17	6.80	07/08
Conductivity	3	145	131	06/17	163	06/10
Temperature	5	12.0	10.8	06/24	13.0	07/08

Well # DZ12_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
151	06/03/85	21.34	258.13	NA	NA	10.9	.T.
152	06/10/85	21.63	257.84	NA	170	14.0	.T.
153	06/17/85	21.96	257.51	7.40	195	12.5	.T.
154	06/24/85	22.27	257.20	7.23	192	11.0	.T.
155	07/01/85	22.79	256.68				.F.
156	07/08/85	24.60	254.87	8.20	210	16.5	.T.
157	07/18/85	24.25	255.22				.F.
158	07/26/85	24.29	255.18				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	8	22.89	24.60	07/08	21.34	06/03
Water Level (MSL)	8	256.58	254.87	07/08	258.13	06/03
pH	3	na	7.23	06/24	8.20	07/08
Conductivity	4	192	170	06/10	210	07/08
Temperature	5	13.0	10.9	06/03	16.5	07/08

Well # DZ13_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VCC
159	06/03/85	20.68	258.78	NA	NA	11.6	.T.
160	06/10/85	20.68	258.78				.F.
161	06/11/85			NA	172	15.5	.T.
162	06/17/85	20.95	258.51	7.21	164	13.6	.T.
163	06/24/85	21.18	258.28	6.73	172	11.3	.T.
164	07/01/85	21.38	258.08				.F.
165	07/08/85	21.55	257.91	7.12	NA	14.1	.T.
166	07/18/85	21.98	257.48				.F.
167	07/26/85	22.35	257.11				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	8	21.34	22.35	07/26	20.68	06/03
Water Level (MSL)	8	258.12	257.11	07/26	258.78	06/03
pH	3	na	6.73	06/24	7.21	06/17
Conductivity	3	169	164	06/17	172	06/11
Temperature	5	13.2	11.3	06/24	15.5	06/11

Well # DZ14_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VCC
168	06/17/85	NA	NA	7.40	114	13.1	.T.
169	06/24/85	24.01	259.98	7.00	111	11.6	.T.
170	07/01/85	24.67	259.32	8.04	110	12.9	.T.
171	07/08/85	24.77	259.22	8.40	103	15.7	.T.
172	07/14/85			7.21	112	12.5	.T.
173	07/18/85	25.47	258.52				.F.
174	07/26/85	25.53	258.46				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	24.89	25.53	07/26	24.01	06/24
Water Level (MSL)	5	259.10	258.46	07/26	259.98	06/24
pH	5	na	7.00	06/24	8.40	07/08
Conductivity	5	110	103	07/08	114	06/17
Temperature	5	13.4	11.6	06/24	15.7	07/08

Well # EPA13A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
175	06/17/85	26.31	257.89				.F.
176	06/24/85	27.15	257.05				.F.
177	07/01/85	27.21	256.99				.F.
178	07/08/85	29.03	255.17				.F.
179	07/26/85	29.77	254.43				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	27.89	29.77	07/26	26.31	06/17
Water Level (MSL)	5	256.31	254.43	07/26	257.89	06/17

Well # EPA13B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
180	06/17/85	24.85					.F.
181	06/24/85	25.15					.F.
182	07/01/85	25.45					.F.
183	07/08/85	25.83					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	4	25.32	25.83	07/08	24.85	06/17

Well # EPA_12 Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
184	06/17/85	42.57	245.03				.F.
185	06/24/85	42.96	244.64				.F.
186	07/01/85	43.35	244.25				.F.
187	07/08/85	43.78	243.82				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	4	43.22	43.78	07/08	42.57	06/17
Water Level (MSL)	4	244.33	243.82	07/08	245.03	06/17

Well # EPA_1A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
188	06/11/85	16.95	255.86				.F.
189	06/17/85	17.17	255.64	7.55	225	11.7	.T.
190	06/24/85	17.75	255.06				.F.
191	07/01/85	18.07	254.74				.F.
192	07/08/85	19.26	253.55				.F.
193	07/12/85			7.70	210	12.1	.T.
194	07/18/85	19.79	253.02				.F.
195	07/26/85	19.92	252.89				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	18.42	19.92	07/26	16.95	06/11
Water Level (MSL)	7	254.39	252.89	07/26	255.86	06/11
pH	2	na	7.55	06/17	7.70	07/12
Conductivity	2	218	210	07/12	225	06/17
Temperature	2	11.9	11.7	06/17	12.1	07/12

Well # EPA_1B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
196	06/11/85	16.43	256.38	NA	220	13.7	.T.
197	06/17/85	16.38	256.43				.F.
198	06/24/85	16.91	255.90				.F.
199	07/01/85	17.24	255.57				.F.
200	07/09/85	18.26	254.55	7.30	NA	14.5	.T.
201	07/12/85			7.45	260	NA	.T.
202	07/18/85	18.92	253.89				.F.
203	07/26/85	19.17	253.64				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	17.62	19.17	07/26	16.38	06/17
Water Level (MSL)	7	255.19	253.64	07/26	256.43	06/17
pH	2	na	7.30	07/09	7.45	07/12
Conductivity	2	240	220	06/11	260	07/12
Temperature	2	14.1	13.7	06/11	14.5	07/09

Well # EPA_1D Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
204	06/11/85	14.41	258.40	NA	143	14.2	.T.
205	06/17/85	14.54	258.27				.F.
206	06/24/85	14.79	258.02				.F.
207	07/01/85	15.02	257.79				.F.
208	07/09/85	15.30	257.51	6.80	NA	14.6	.T.
209	07/18/85	15.77	257.04				.F.
210	07/25/85	16.09	256.72				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	15.13	16.09	07/25	14.41	06/11
Water Level (MSL)	7	257.68	256.72	07/25	258.40	06/11
pH	1	na	6.80	07/09	6.80	07/09
Conductivity	1	143	143	06/11	143	06/11
Temperature	2	14.4	14.2	06/11	14.6	07/09

Well # EPA_2A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
211	06/11/85	12.82	258.09	NA	182	13.4	.T.
212	06/17/85	12.98	257.93				.F.
213	06/24/85	13.22	257.69				.F.
214	07/01/85	13.43	257.48				.F.
215	07/09/85	13.73	257.18	7.40	NA	14.6	.T.
216	07/12/85			7.50	205	NA	.T.
217	07/18/85	14.17	256.74				.F.
218	07/26/85	14.46	256.45				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	13.54	14.46	07/26	12.82	06/11
Water Level (MSL)	7	257.37	256.45	07/26	258.09	06/11
pH	2	na	7.40	07/09	7.50	07/12
Conductivity	2	194	182	06/11	205	07/12
Temperature	2	14.0	13.4	06/11	14.6	07/09

well # EPA_2B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
219	06/11/85	12.83	258.08	NA	153	14.2	.T.
220	06/17/85	12.92	257.99				.F.
221	06/24/85	13.18	257.73				.F.
222	07/01/85	13.38	257.53				.F.
223	07/09/85	13.66	257.25	7.20	NA	13.9	.T.
224	07/12/85			7.50	200	NA	.T.
225	07/18/85	14.09	256.82				.F.
226	07/26/85	14.41	256.50				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	13.50	14.41	07/25	12.83	06/11
Water Level (MSL)	7	257.41	256.50	07/26	258.08	06/11
pH	2	na	7.20	07/09	7.50	07/12
Conductivity	2	176	153	06/11	200	07/12
Temperature	2	14.1	13.9	07/09	14.2	06/11

well # EPA_3A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
227	06/11/85	14.01	257.73	NA	210	14.7	.T.
228	06/17/85	14.15	257.59				.F.
229	06/24/85	14.41	257.33				.F.
[illegible]	07/01/85	14.61	257.13				.F.
[illegible]	07/09/85	14.85	256.89	7.20	NA	16.1	.T.
[illegible]	07/18/85	15.23	256.51				.F.
[illegible]	07/26/85	15.57	256.17				.F.

[illegible]	n	Mean	Range Low	(date)	Range High	(date)
[illegible]	7	14.63	15.57	07/26	14.01	06/11
[illegible]	7	257.15	256.17	07/26	257.73	06/11
[illegible]	1	na	7.20	07/09	7.20	07/09
[illegible]	1	210	210	06/11	210	06/11
[illegible]	2	15.4	14.7	06/11	16.1	07/09

Well # EPA_3B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
234	06/11/85	14.15	257.59				.F.
235	06/17/85	14.27	257.47	6.65	172	15.5	.T.
236	06/24/85	14.50	257.24				.F.
237	07/01/85	14.68	257.06				.F.
238	07/09/85	14.84	256.90	6.50	NA	15.2	.T.
239	07/12/85			7.55	173	NA	.T.
240	07/18/85	15.25	256.49				.F.
241	07/26/85	15.54	256.20				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	14.75	15.54	07/26	14.15	06/11
Water Level (MSL)	7	256.99	256.20	07/26	257.59	06/11
pH	3	na	6.50	07/09	7.55	07/12
Conductivity	2	172	172	06/17	173	07/12
Temperature	2	15.3	15.2	07/09	15.5	06/17

Well # EPA_4A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
242	06/11/85	14.67	254.77	NA	178	14.6	.T.
243	06/24/85	15.54	253.90				.F.
244	07/01/85	15.88	253.56				.F.
245	07/09/85	16.77	252.67	7.70	NA	14.3	.T.
246	07/18/85	17.27	252.17				.F.
247	07/26/85	17.51	251.93				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	6	16.27	17.51	07/26	14.67	06/11
Water Level (MSL)	6	253.17	251.93	07/26	254.77	06/11
pH	1	na	7.70	07/09	7.70	07/09
Conductivity	1	178	178	06/11	178	06/11
Temperature	2	14.4	14.3	07/09	14.6	06/11

Well # EPA_45 Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
248	06/11/85	14.31	255.13	NA	188	13.2	.T.
249	06/17/85	14.44	255.00				.F.
250	06/17/85	14.78	254.66				.F.
251	06/24/85	15.14	254.30				.F.
252	07/01/85	15.44	254.00				.F.
253	07/09/85	16.27	253.17	7.20	NA	14.1	.T.
254	07/12/85			7.70	220	NA	.T.
255	07/18/85	16.68	252.56				.F.
256	07/26/85	17.11	252.33				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	8	15.55	17.11	07/26	14.31	06/11
Water Level (MSL)	8	253.69	252.33	07/26	255.13	06/11
pH	2	na	7.20	07/09	7.70	07/12
Conductivity	2	204	188	06/11	220	07/12
Temperature	2	13.7	13.2	06/11	14.1	07/09

Well # EPA_46 Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
257	06/11/85	12.26	257.18	NA	165	13.0	.T.
258	06/17/85	12.32	257.12				.F.
259	06/24/85	12.53	256.91				.F.
260	07/01/85	12.69	256.75				.F.
261	07/09/85	12.89	256.55	6.70	NA	13.8	.T.
262	07/12/85			7.75	175	NA	.T.
263	07/18/85	13.31	256.13				.F.
264	07/26/85	13.57	255.87				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	12.80	13.57	07/26	12.26	06/11
Water Level (MSL)	7	256.64	255.87	07/26	257.18	06/11
pH	2	na	6.70	07/09	7.75	07/12
Conductivity	2	170	165	06/11	175	07/12
Temperature	2	13.4	13.0	06/11	13.8	07/09

well # EPA_5A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
265	06/11/85	11.68	256.54	NA	220	14.2	.T.
266	06/17/85	11.90	256.32				.F.
267	06/24/85	12.18	256.04				.F.
268	07/01/85	12.42	255.80				.F.
269	07/09/85	12.72	255.50	7.10	NA	13.4	.T.
270	07/12/85			7.80	260	13.9	.T.
271	07/18/85	12.96	255.26				.F.
272	07/26/85	13.20	255.02				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	12.44	13.20	07/26	11.68	06/11
Water Level (MSL)	7	255.78	255.02	07/26	256.54	06/11
pH	2	na	7.10	07/09	7.80	07/12
Conductivity	2	240	220	06/11	260	07/12
Temperature	3	13.8	13.4	07/09	14.2	06/11

well # EPA_6A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
273	06/11/85	9.58	254.53	NA	210	12.2	.T.
274	06/17/85	9.77	254.34				.F.
275	06/24/85	10.04	254.07				.F.
276	07/01/85	10.33	253.78				.F.
277	07/09/85	10.72	253.39	7.20	NA	14.4	.T.
278	07/18/85	12.25	251.86				.F.
279	07/26/85	11.56	252.55				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	10.61	12.25	07/18	9.58	06/11
Water Level (MSL)	7	253.50	251.86	07/18	254.53	06/11
pH	1	na	7.20	07/09	7.20	07/09
Conductivity	1	210	210	06/11	210	06/11
Temperature	2	13.3	12.2	06/11	14.4	07/09

Well # EPA_66 Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
230	06/11/85	9.58	254.53	NA	140	11.9	.T.
231	06/17/85	9.55	254.56				.F.
232	06/24/85	9.88	254.23				.F.
233	07/01/85	10.13	253.98				.F.
234	07/09/85	10.49	253.62	6.80	NA	15.1	.T.
235	07/18/85	12.00	252.11				.F.
236	07/26/85	11.38	252.73				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	10.43	12.00	07/18	9.55	06/17
Water Level (MSL)	7	253.68	252.11	07/18	254.56	06/17
pH	1	na	6.80	07/09	6.80	07/09
Conductivity	1	140	140	06/11	140	06/11
Temperature	2	13.5	11.9	06/11	15.1	07/09

Well # EPA_74 Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
237	06/11/85	10.08	247.03	NA	183	15.0	.T.
238	06/17/85	10.31	246.80				.F.
239	06/24/85	10.54	246.57				.F.
240	07/01/85	10.81	246.30				.F.
241	07/09/85	11.10	246.01	6.80	NA	15.8	.T.
242	07/18/85	11.67	245.44				.F.
243	07/26/85	11.96	245.15				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	7	10.92	11.96	07/26	10.08	06/11
Water Level (MSL)	7	246.19	245.15	07/26	247.03	06/11
pH	1	na	6.80	07/09	6.80	07/09
Conductivity	1	183	183	06/11	183	06/11
Temperature	2	15.4	15.0	06/11	15.8	07/09

Well # EPA_7B Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
294	06/11/85	9.39	247.72	NA	187	13.8	.T.
295	06/17/85	10.79	246.32				.F.
296	06/24/85	10.96	246.15				.F.
297	07/01/85	11.19	245.92				.F.
298	07/09/85	11.37	245.74	6.90	NA	15.8	.T.
299	07/18/85	11.80	245.31				.F.
300	07/26/85	12.07	245.04				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	11.08	12.07	07/26	9.39	06/11
Water Level (MSL)	7	246.03	245.04	07/26	247.71	06/11
pH	1	na	6.90	07/09	6.90	07/09
Conductivity	1	187	187	06/11	187	06/11
Temperature	2	[illegible]	13.8	06/11	15.8	07/09

Well # EPA_8A Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
301	06/11/85	13.31	251.82	NA	181	13.2	.T.
302	06/17/85	13.45	251.68				.F.
303	06/24/85	13.75	251.38				.F.
304	07/01/85	14.03	251.10				.F.
305	07/09/85	14.49	250.64	7.10	NA	15.2	.T.
306	07/18/85	15.00	250.03				.F.
307	07/26/85	15.39	249.74				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	14.17	15.39	07/26	13.31	06/11
Water Level (MSL)	7	250.96	249.74	07/26	251.82	06/11
pH	1	na	7.10	07/09	7.10	07/09
Conductivity	1	181	181	06/11	181	06/11
Temperature	2	14.2	13.2	06/11	15.2	07/09

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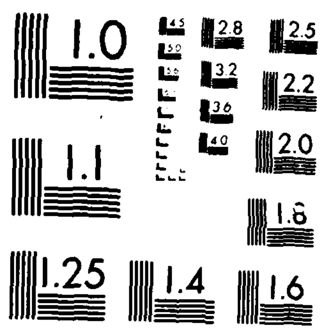

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Well # [illegible] Record Summary

Record #	DATE	H2O_LEVEL	H2O_SEA_LEV	pH	SP_COND	TEMP	VOC
308	06/11/85	12.48	252.55	NA	155	15.4	.T.
309	06/17/85	12.54	252.49				.F.
310	06/24/85	12.88	252.15				.F.
311	07/01/85	13.14	251.89				.F.
312	07/09/85	13.50	251.53	6.60	NA	17.4	.T.
313	07/18/85	13.96	251.07				.F.
314	07/26/85	14.28	250.75				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	7	13.25	14.28	07/26	12.48	06/11
Water Level (MSL)	7	251.78	250.75	07/26	252.55	06/11
pH	1	na	6.60	07/09	6.60	07/09
Conductivity	1	155	155	06/11	155	06/11
Temperature	2	16.4	15.4	06/11	17.4	07/09

Well # [illegible] Record Summary

Record #	DATE	H2O_LEVEL	H2O_SEA_LEV	pH	SP_COND	TEMP	VOC
315	06/17/85	19.00	257.85	6.30	121	12.0	.T.
316	06/24/85	19.23	257.62				.F.
317	07/01/85	19.39	257.46				.F.
318	07/08/85	19.54	257.31				.F.
319	07/15/85			7.30	124	NA	.T.
320	07/23/85	20.13	256.72				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	19.46	20.13	07/23	19.00	06/17
Water Level (MSL)	5	257.39	256.72	07/23	257.85	06/17
pH	2	na	6.30	06/17	7.30	07/15
Conductivity	2	122	121	06/17	124	07/15
Temperature	1	12.0	12.0	06/17	12.0	06/17

Well # L001_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
321	06/17/85	NA	NA	6.75	122	10.5	.T.
322	07/16/85	NA	NA	7.20	118	NA	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	2	na	6.75	06/17	7.20	07/16
Conductivity	2	120	118	07/16	122	06/17
Temperature	1	10.5	10.5	06/17	10.5	06/17

Well # L002_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
323	06/17/85	17.51	255.08	6.50	123	19.7	.T.
324	06/24/85	17.73	254.86				.F.
325	07/01/85	17.93	254.66				.F.
326	07/16/85			7.20	115	NA	.T.
327	07/26/85	18.88	253.71				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	4	18.01	18.88	07/26	17.51	06/17
Water Level (MSL)	4	254.58	253.71	07/26	255.08	06/17
pH	2	na	6.50	06/17	7.20	07/16
Conductivity	2	119	115	07/16	123	06/17
Temperature	1	19.7	19.7	06/17	19.7	06/17

Well # L003_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
[illegible]	06/17/85	20.98	254.59	5.75	116	20.8	.T.
[illegible]	06/24/85	21.15	254.72				.F.
[illegible]	07/01/85	21.35	254.22				.F.
[illegible]	07/08/85	21.21	254.46				.F.
[illegible]	07/16/85			NA	NA	NA	.T.
[illegible]	07/26/85	22.07	253.50				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	21.42	22.07	07/26	20.98	06/17
Water Level (MSL)	5	254.25	253.50	07/26	254.59	06/17
pH	1	na	5.75	06/17	5.75	06/17
Conductivity	1	116	116	06/17	116	06/17
Temperature	1	20.8	20.8	06/17	20.8	06/17

Well # 1004_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
334	06/17/88	17.91	251.73	7.05	173	17.6	.T.
335	06/24/88	18.08	251.56				.F.
336	07/01/88	18.33	251.31				.F.
337	07/08/88	18.49	251.15				.F.
338	07/15/88			7.00	125	NA	.T.
339	07/25/88	19.27	250.37				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	5	18.42	19.27	07/25	17.91	06/17
Water Level (MSL)	5	251.22	250.37	07/25	251.73	06/17
pH	2	na	7.00	07/15	7.05	06/17
Conductivity	2	148	125	07/15	173	06/17
Temperature	1	17.6	17.6	06/17	17.6	06/17

Well # 1004_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
340	06/17/88	NA	NA	6.75	155	12.3	.T.
341	07/15/88	NA	NA	7.30	145	NA	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	2	na	6.75	06/17	7.30	07/15
Conductivity	2	150	145	07/15	155	06/17
Temperature	1	12.3	12.3	06/17	12.3	06/17

Well # 1005_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
342	06/17/88	27.94	250.80	6.88	144	16.4	.T.
343	06/24/88	28.11	250.63				.F.
344	07/01/88	28.36	250.38				.F.
345	07/08/88	28.58	250.16				.F.
346	07/15/88			7.12	124	NA	.T.
347	07/25/88	29.30	249.44				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	5	28.46	29.30	07/25	27.94	06/17
Water Level (MSL)	5	250.28	249.44	07/25	250.80	06/17
pH	2	na	6.88	06/17	7.12	07/15
Conductivity	2	133	124	07/15	144	06/17
Temperature	1	16.4	16.4	06/17	16.4	06/17

well # L006_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
348	06/17/85	27.07	260.21	6.55	148	14.1	.T.
349	06/24/85	27.25	260.03				.F.
350	07/01/85	27.33	259.95				.F.
351	07/08/85	27.47	259.81				.F.
352	07/15/85			7.10	143	NA	.T.
353	07/26/85	27.79	259.49				.F.

Parameter	n	mean	Range Low	(date)	Range High	(date)
Depth to water	5	27.38	27.79	07/26	27.07	06/17
Water Level (MSL)	5	259.90	259.49	07/26	260.21	06/17
pH	2	na	6.55	06/17	7.10	07/15
Conductivity	2	146	143	07/15	148	06/17
Temperature	1	14.1	14.1	06/17	14.1	06/17

well # L006_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
354	06/17/85	NA	NA	6.75	133	14.8	.T.
355	07/18/85	NA	NA	7.10	139	NA	.T.

Parameter	n	mean	Range Low	(date)	Range High	(date)
pH	2	na	6.75	06/17	7.10	07/18
Conductivity	2	136	133	06/17	139	07/18
Temperature	1	14.8	14.8	06/17	14.8	06/17

well # L007_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
356	07/18/85	32.35	255.64				.F.

Parameter	n	mean	Range Low	(date)	Range High	(date)
Depth to water	1	32.35	32.35	07/18	32.35	07/18
Water Level (MSL)	1	255.64	255.64	07/18	255.64	07/18

Well # L008_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
357	07/26/85	32.72					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	32.72	32.72	07/26	32.72	07/26

Well # L009_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
358	07/26/85	29.83	258.95				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	29.83	29.83	07/26	29.83	07/26
Water Level (MSL)	1	258.95	258.95	07/26	258.95	07/26

Well # L010_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
359	07/26/85	29.82					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	29.82	29.82	07/26	29.82	07/26

Well # L011_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
360	07/26/85	29.35	260.34				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	29.35	29.35	07/26	29.35	07/26
Water Level (MSL)	1	260.34	260.34	07/26	260.34	07/26

Well # LC12_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
361	06/17/85	29.29	249.55				.F.
362	06/24/85	29.47	249.37				.F.
363	07/01/85	29.66	249.18				.F.
364	07/08/85	29.83	249.01				.F.
365	07/26/85	30.45	248.39				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	29.74	30.45	07/26	29.29	06/17
Water Level (MSL)	5	249.10	248.39	07/26	249.55	06/17

Well # LC13_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
366	06/17/85	28.64	251.29	6.50	118	16.1	.T.
367	06/24/85	28.88	251.05				.F.
368	07/01/85	29.05	250.88				.F.
369	07/08/85	29.25	250.68				.F.
370	07/16/85			7.02	124	NA	.T.
371	07/26/85	29.95	249.98				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	29.15	29.95	07/26	28.64	06/17
Water Level (MSL)	5	250.78	249.98	07/26	251.29	06/17
pH	2	na	6.50	06/17	7.02	07/16
Conductivity	2	121	118	06/17	124	07/16
Temperature	1	16.1	16.1	06/17	16.1	06/17

Well # LC13_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
372	06/17/85	NA	NA	6.75	121	14.9	.T.
373	07/16/85	NA	NA	7.00	123	NA	.T.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
pH	2	na	6.75	06/17	7.00	07/16
Conductivity	2	122	121	06/17	123	07/16
Temperature	1	14.9	14.9	06/17	14.9	06/17

well # LC15_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
374	07/25/85	23.60					.F.

Parameter	n	mean	Range Low	(date)	Range High	(date)
Depth to water	1	23.60	23.60	07/25	23.60	07/25

well # LC16_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
375	06/17/85	15.57		5.22	138	14.6	.T.
376	06/24/85	15.74					.F.
377	07/01/85	15.92					.F.
378	07/08/85	16.10					.F.
379	07/12/85			7.55	145	NA	.T.
380	07/25/85	17.04					.F.

Parameter	n	mean	Range Low	(date)	Range High	(date)
Depth to water	5	16.07	17.04	07/25	15.57	06/17
pH	3	na		06/24	7.55	07/12
Conductivity	3	142	138	06/17	145	07/12
Temperature	2	14.6	14.6	06/17	14.6	06/17

well # LC16_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
381	06/17/85	NA	NA	7.04	157	17.5	.T.
382	07/12/85	NA	NA	7.55	147	NA	.T.

Parameter	n	mean	Range Low	(date)	Range High	(date)
pH	2	na	7.04	06/17	7.55	07/12
Conductivity	2	157	147	07/12	157	06/17
Temperature	1	17.5	17.5	06/17	17.5	06/17

Well # L017_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
383	07/26/85	29.70					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	29.70	29.70	07/26	29.70	07/26

Well # L018_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
384	07/26/85	22.40					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	22.40	22.40	07/26	22.40	07/26

Well # L019_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
385	07/26/85	27.99					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	27.99	27.99	07/26	27.99	07/26

Well # L019_B Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
38[illegible]	07/26/85	28.06					.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	28.06	28.06	07/26	28.[illegible]	07/26

Well # L019_I Record Summary

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Record#  DATE       H2O_LEVEL H2O_SEALEV PH    SP_COND TEMP VOC
    387  07/26/85 28.63                                   .F.
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Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	28.63	28.63	07/26	28.63	07/26

Well # L020_A Record Summary

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Record#  DATE       H2O_LEVEL H2O_SEALEV PH    SP_COND TEMP VOC
    388  07/26/85 29.22                                   .F.
```

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	29.22	29.22	07/26	29.22	07/26

Well # L021_A Record Summary

```
Record#  DATE       H2O_LEVEL H2O_SEALEV PH    SP_COND TEMP VOC
    389  07/26/85 13.30                                   .F.
```

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	13.20	13.20	07/26	13.20	07/26

Well # L022_A Record Summary

```
Record#  DATE       H2O_LEVEL H2O_SEALEV PH    SP_COND TEMP VOC
    390  07/26/85 37.57                                   .F.
```

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	37.57	37.57	07/26	37.57	07/26

Well # L022_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
031	07/25/85	14.38				F.	

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	14.38	14.38	07/85	14.38	07/85

Well # L024_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
032	07/22/85	13.57				F.	

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	13.57	13.57	07/85	13.57	07/85

Well # L025_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
033	07/25/85	10.99				F.	

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	10.99	10.99	07/85	10.99	07/85

Well # LP07_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
034	07/15/85	20.66				F.	

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	20.66	20.66	07/85	20.66	07/85

Well = LF08_[illegible] Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	[illegible]
[illegible]	07/23/85	17.35	270.74				[illegible]

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	17.35	17.35	07/85	17.35	07/85
Water Level (MSL)	1	270.74	270.74	07/85	270.74	07/85

Well = LF09_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	[illegible]
[illegible]	07/23/85	10.37					[illegible]

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	10.37	10.37	07/85	10.37	07/85

Well = LF10_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	[illegible]
[illegible]	07/26/85	14.82	[illegible]				[illegible]

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	1	14.82	14.82	07/85	14.82	[illegible]
Water Level (MSL)	1	[illegible]	[illegible]	07/85	[illegible]	[illegible]

Well # [illegible] Record Summary

Record #	DATE	WELL_LEVEL	WELL_SEA-LEV	pH	[illegible]	TEMP	[illegible]
[illegible]	07/[illegible]/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	07/[illegible]/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	07/[illegible]/88			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	07/[illegible]/88			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	07/[illegible]/88			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	07/[illegible]/88	33.44	[illegible].77				[illegible]

Parameter	n	mean	Range Low	date	Range High	date
Depth to Water	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Water Level MSL	[illegible]	[illegible]	[illegible].77	[illegible]	[illegible]	[illegible]
pH	[illegible]	na	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Temperature	[illegible]	[illegible]	[illegible]	[illegible]	13.1	07/14

Well # [illegible] Record Summary

Record #	DATE	WELL_LEVEL	WELL_SEA-LEV	pH	[illegible]	TEMP	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]				[illegible]

Parameter	n	mean	Range Low	date	Range High	date
Depth to Water	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Water Level MSL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
pH	[illegible]	na	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
Temperature	[illegible]	[illegible]	[illegible]	[illegible]	18.6	07/08

Well # L203_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
410	07/01/88	NA	NA	7.48	126	13.[illegible]	[illegible]
411	07/10/88	19.37	253.69	6.90	140	13.7	[illegible]
412	07/14/88			7.19	133	NA	[illegible]
413	07/15/88			7.50	NA	NA	[illegible]
414	07/18/88			7.75	134	NA	[illegible]
415	07/25/88	20.10	252.96				[illegible]

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	2	19.73	20.10	07/25	19.37	07/10
Water Level (MSL)	2	253.33	252.96	07/25	253.69	07/10
pH	5	na	6.90	07/10	7.75	07/18
Conductivity	4	133	126	07/[illegible]	140	07/10
Temperature	2	13.5	13.[illegible]	07/01	13.7	07/10

Well # L204_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
416	07/01/88	NA	NA	7.40	152	13.5	[illegible]
417	07/10/88	24.04	255.94	8.[illegible]	155	26.1	[illegible]
418	07/14/88			7.00	155	NA	[illegible]
419	07/15/88			7.50	155	NA	[illegible]
420	07/18/88			7.70	156	NA	[illegible]
421	07/25/88	24.82	255.16				[illegible]

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	2	24.43	24.82	07/25	24.04	07/10
Water Level (MSL)	2	255.55	255.16	07/25	255.94	07/10
pH	5	na	7.00	07/14	8.[illegible]	07/10
Conductivity	5	155	152	07/01	156	07/18
Temperature	2	19.8	13.5	07/01	26.1	07/18

Well # T201_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
482	06/17/85	25.21	251.24	7.09	240	13.1	.T.
483	06/24/85	25.91	250.54	7.20	172	12.7	.T.
484	07/01/85	26.29	250.16	6.60	230	13.0	.T.
485	07/08/85	27.05	249.40	7.40	NA	14.3	.T.
486	07/14/85			7.46	250	13.1	.T.
487	07/26/85	27.69	248.76				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	26.43	27.69	07/26	25.21	06/17
Water Level (MSL)	5	250.02	248.76	07/26	251.24	06/17
pH	5	na	6.60	07/01	7.46	07/14
Conductivity	4	223	172	06/24	250	07/14
Temperature	5	13.2	12.7	06/24	14.3	07/08

Well # T202_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
488	06/17/85	15.88	252.41	6.94	182	12.3	.T.
489	06/24/85	16.13	252.16	6.99	195	12.4	.T.
490	07/01/85	16.66	251.63	7.05	180	12.5	.T.
491	07/08/85	17.25	251.04	7.20	NA	17.3	.T.
492	07/12/85			7.35	200	NA	.T.
493	07/14/85			7.40	197	11.9	.T.
494	07/26/85	17.86	250.43				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	16.76	17.86	07/26	15.88	06/17
Water Level (MSL)	5	251.53	250.43	07/26	252.41	06/17
pH	6	na	6.94	06/17	7.35	07/12
Conductivity	5	191	180	07/01	200	07/12
Temperature	5	13.3	11.9	07/14	17.3	07/08

Well # TZ13_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
435	06/17/85	24.87	252.30	7.[illegible]	155	13.3	.T.
436	06/24/85	24.90	252.07	7.22	170	12.0	.T.
437	07/01/85	25.10	251.87	7.41	163	11.4	.T.
438	07/08/85	25.26	251.71	7.50	NA	14.6	.T.
439	07/14/85			6.93	137	NA	.T.
440	07/28/85	26.08	250.89				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	25.[illegible]	26.08	07/28	24.87	06/17
Water level (MSL)	5	251.77	250.89	07/28	252.30	06/[illegible]
pH	5	na	6.93	07/14	7.50	07/[illegible]
Conductivity	4	15[illegible]	137	07/14	170	06/24
Temperature	4	1[illegible].3	11.4	07/01	14.6	07/08

Well # TZ14_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_ELEV	PH	SP_COND	TEMP	VOC
441	06/17/85	23.00	[illegible]	[illegible]	[illegible]	13.5	.T.
442	06/24/85	25.12	252.13	6.94	127	[illegible]	.T.
443	07/01/85	25.49	251.57	6.98	115	11.7	.T.
444	07/08/85	12.56	264.75	7.40	NA	13.9	.T.
445	07/14/85			7.05	173	11.6	.T.
446	07/28/85	26.47	250.80				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	[illegible]	[illegible]	07/28	12.56	07/[illegible]
Water level (MSL)	5	25[illegible]	250.80	07/28	264.75	07/[illegible]
pH	5	na	6.94	06/24	7.40	07/08
Conductivity	4	[illegible]	[illegible]	[illegible]	173	07/14
Temperature	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Well # TZW5_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
447	06/17/85	16.70	251.50	7.11	152	12.6	.T.
448	06/24/85	16.88	251.32	7.02	162	11.5	.T.
449	07/01/85	17.09	251.11	7.30	144	12.0	.T.
450	07/10/85	17.35	250.85	7.40	147	13.6	.T.
451	07/14/85			7.13	154	11.9	.T.
452	07/28/85	18.06	250.14				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	17.22	18.06	07/28	16.70	06/17
Water Level (MSL)	5	250.98	250.14	07/28	251.50	06/17
pH	5	na	7.02	06/24	7.40	07/10
Conductivity	5	154	144	07/01	152	06/17
Temperature	5	12.4	11.5	06/24	13.6	07/10

Well # TZW6_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
453	06/17/85	23.44	248.60	6.99	177	12.7	.T.
454	06/24/85	23.80	248.24	7.18	188	12.0	.T.
455	07/01/85	24.01	248.03	7.22	173	13.4	.T.
456	07/10/85	19.20	252.84	7.20	156	14.8	.T.
457	07/12/85			7.85	183	NA	.T.
458	07/14/85			7.11	185	12.8	.T.
459	07/28/85	24.99	247.05				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	23.09	24.99	07/28	19.20	07/10
Water Level (MSL)	5	248.95	247.05	07/28	252.84	07/10
pH	[illegible]	na	6.99	06/17	7.85	07/12
Conductivity	[illegible]	178	156	07/10	188	06/24
Temperature	5	13.1	12.0	06/24	14.8	07/10

Well = TZ07_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	pH	SP_COND	TEMP	VOC
460	06/17/85	14.63	247.41	7.50	210	12.5	.T.
461	06/24/85	14.95	247.10	7.71	187	14.1	.T.
462	07/01/85	15.31	246.72	7.39	200	13.1	.T.
463	07/10/85	15.75	246.30	.70	222	14.3	.T.
464	07/14/85			6.80	235	13.7	.T.
465	07/26/85	16.35	245.40				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	5	15.45	16.35	07/26	14.63	06/17
Water Level (MSL)	5	246.59	245.40	07/26	247.41	06/17
pH	5	na	.70	07/10	7.71	06/24
Conductivity	5	207	187	06/24	235	07/14
Temperature	5	13.5	12.5	06/17	14.3	07/10

Well = TZ08_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	pH	SP_COND	TEMP	VOC
466	07/10/85	27.04	254.73	7.40	180	15.2	.T.
467	07/11/85			7.75	113	NA	.T.
468	07/14/85			6.71	181	NA	.T.
469	07/15/85			7.35	NA	NA	.T.
470	07/16/85			7.60	108	NA	.T.
471	07/23/85	27.93	253.83				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to water	2	27.48	27.93	07/23	27.04	07/10
Water Level (MSL)	2	254.28	253.83	07/23	254.73	07/10
pH	5	na	6.71	07/14	7.75	07/11
Conductivity	4	147	108	07/16	181	07/14
Temperature	1	15.2	15.2	07/10	15.2	07/10

Well # [illegible] Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
472	07/10/85	14.58	244.42	7.50	174	17.0	.T.
473	07/12/85			7.30	190	NA	.T.
474	07/14/85			6.89	191	13.3	.T.
475	07/16/85			7.20	NA	NA	.T.
476	07/18/85			7.40	185	NA	.T.
477	07/25/85	15.30	243.80				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	2	14.94	15.30	07/25	14.58	07/10
Water Level (MSL)	2	243.96	243.80	07/25	244.42	07/10
pH	5	na	6.89	07/14	7.50	07/10
Conductivity	4	188	174	07/10	191	07/14
Temperature	2	15.4	13.3	07/14	17.0	07/10

Well # [illegible] Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
478	07/10/85	10.98	245.04	7.30	200	15.4	.T.
479	07/12/85			7.70	200	NA	.T.
480	07/14/85			7.20	205	12.1	.T.
481	07/16/85			7.80	NA	NA	.T.
482	07/18/85			7.50	225	NA	.T.
483	07/25/85	11.77	244.25				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	2	11.38	11.77	07/25	10.98	07/10
Water Level (MSL)	2	244.65	244.25	07/25	245.04	07/10
pH	5	na	7.20	07/14	7.80	07/16
Conductivity	4	208	200	07/10	225	07/18
Temperature	2	13.8	12.1	07/14	15.4	07/10

Well # TZ11_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
484	07/16/85			7.30	183	NA	.T.
485	07/18/85			7.50	194	NA	.T.
486	07/22/85			7.53	200	NA	.T.
487	07/23/85			7.55	NA	NA	.T.
488	07/24/85			7.22	195	NA	.T.
489	07/26/85	22.03	250.75				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	1	22.03	22.03	07/26	22.03	07/26
Water Level (MSL)	1	250.75	250.75	07/26	250.75	07/26
pH	5	na	7.22	07/24	7.55	07/23
Conductivity	4	193	183	07/16	200	07/22

Well # TZ12_A Record Summary

Record#	DATE	H2O_LEVEL	H2O_SEALEV	PH	SP_COND	TEMP	VOC
490	07/16/85			7.40	NA	NA	.T.
491	07/18/85			7.40	142	NA	.T.
492	07/22/85			7.43	155	NA	.T.
493	07/23/85			7.38	NA	NA	.T.
494	07/24/85			7.33	168	NA	.T.
495	07/26/85	19.91	252.87				.F.

Parameter	n	Mean	Range Low	(date)	Range High	(date)
Depth to Water	1	19.91	19.91	07/26	19.91	07/26
Water Level (MSL)	1	252.87	252.87	07/26	252.87	07/26
pH	5	na	7.33	07/24	7.43	07/22

APPENDIX F

CHEMISTRY DATA

F.1 - GC Chromatograms from Soil Gas Survey, Base Housing Gate, McChord AFB, Washington, July 24-27, 1985

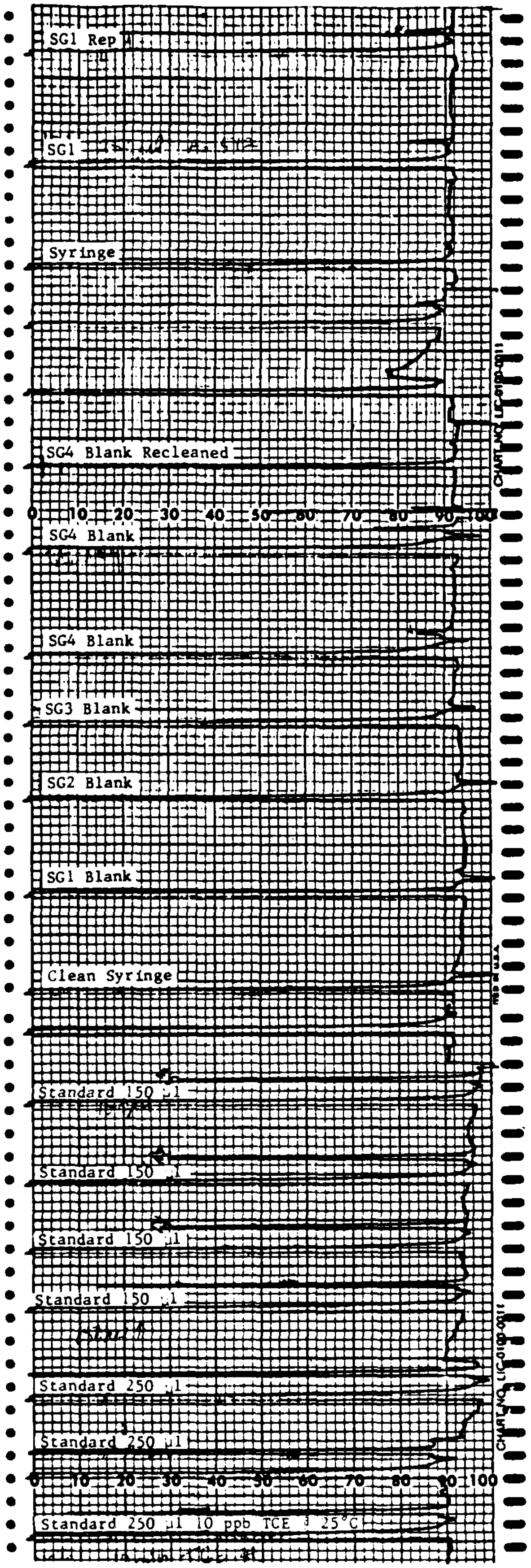
F.2 - Trichloroethylene and 1,2-trans-dichloroethylene Stability in Groundwater

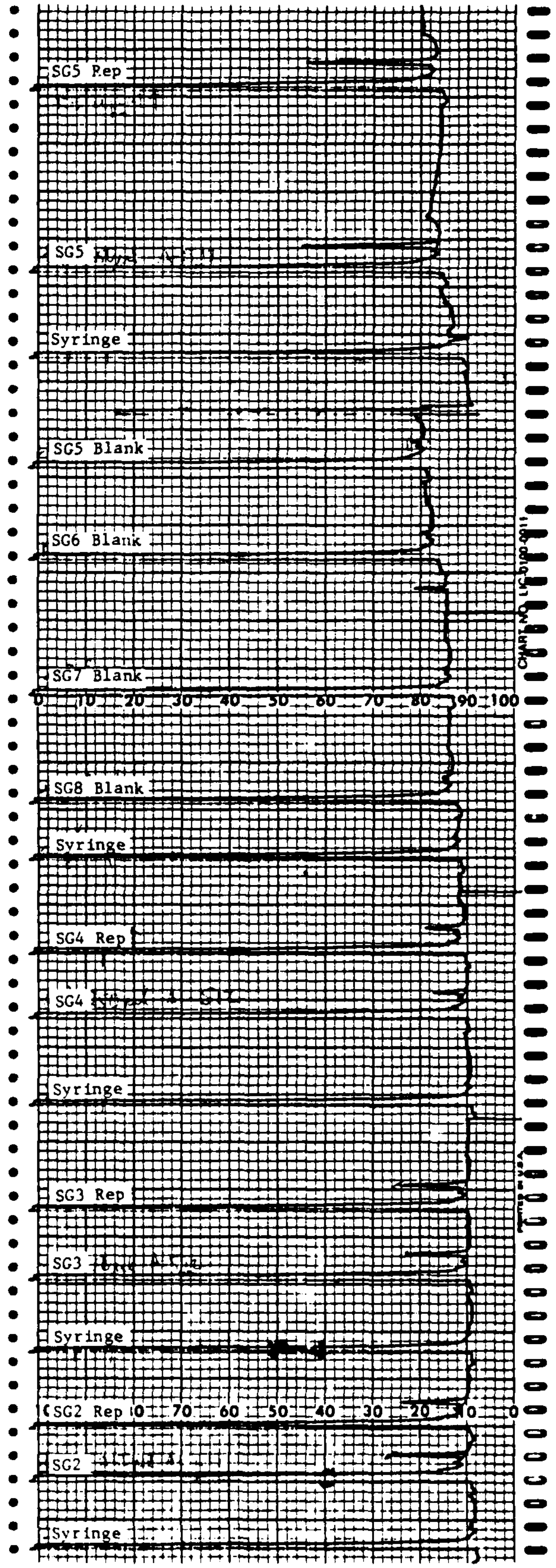
F.3 - Quality Control Reports for Duplicate and Matrix Spike Analysis

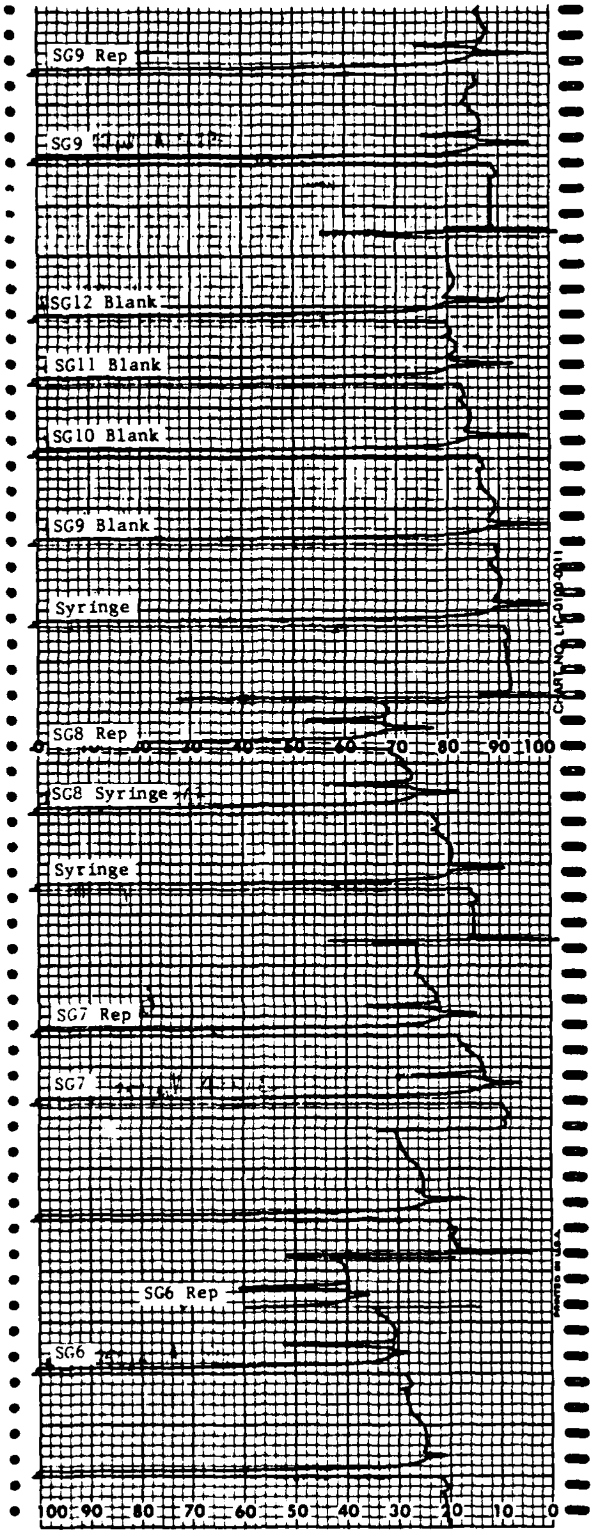
F.4 - Analytical Reports for Water Samples to Determine the Presence of Volatile Organic Chemicals Using EPA Methods 601 and 602

Appendix F.1

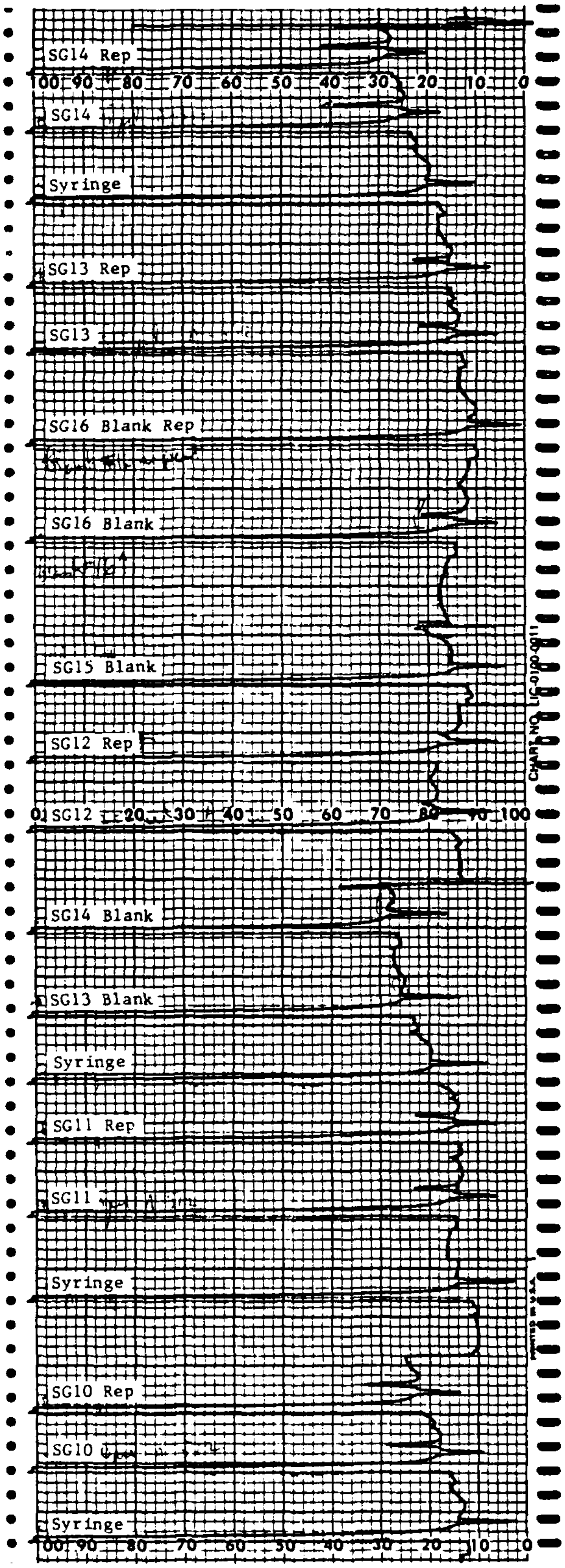
GC Chromatograms from Soil Gas Survey
Base Housing Gate, McChord AFB, Washington
July 24-27, 1985


SG1 Rep
SG1
Syringe
SG4 Blank Recleaned
0 10 20 30 40 50 60 70 80 90 100
SG4 Blank
SG4 Blank
SG3 Blank
SG2 Blank
SG1 Blank
Clean Syringe
Standard 150 μl
Standard 150 μl
Standard 150 μl
Standard 150 μl
Standard 250 μl
Standard 250 μl
0 10 20 30 40 50 60 70 80 90 100
Standard 250 μl 10 ppb TCE @ 25°C

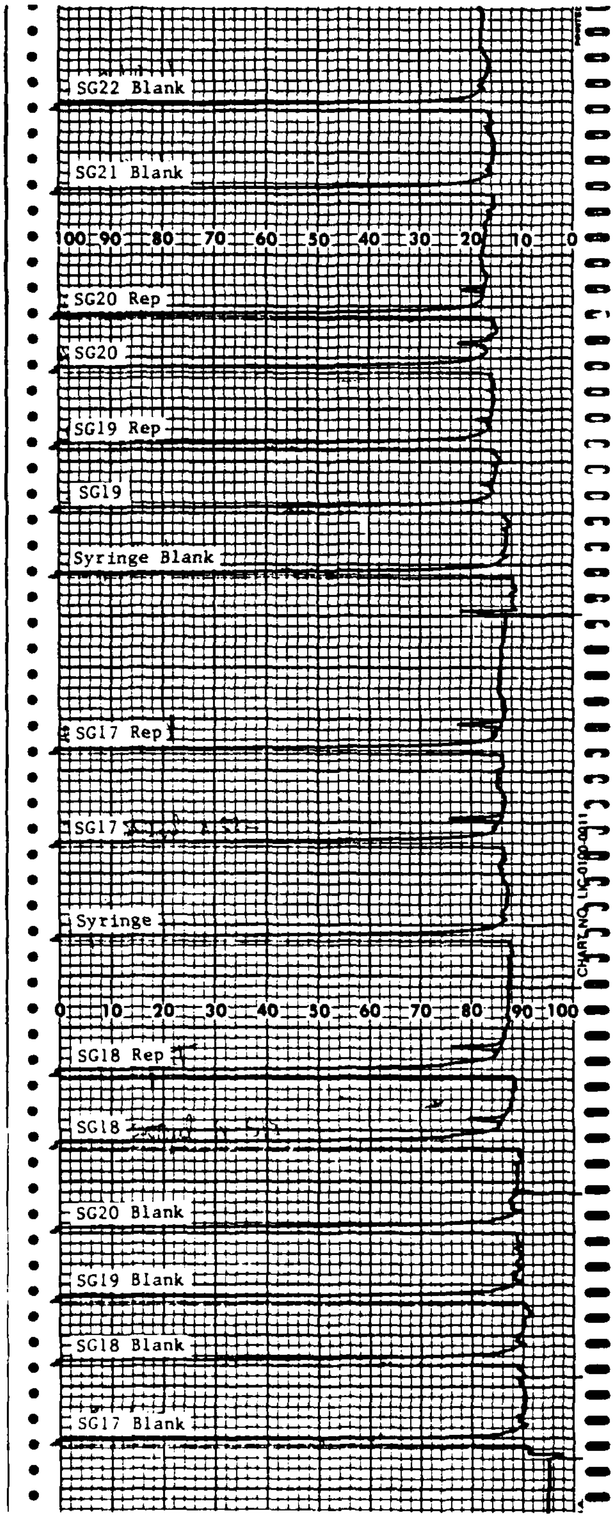

SG5 Rep
SG5
Syringe
SG5 Blank
SG6 Blank
SG7 Blank
0 10 20 30 40 50 60 70 80 90 100
SG8 Blank
Syringe
SG4 Rep
SG4
Syringe
SG3 Rep
SG3
Syringe
SG2 Rep
SG2
Syringe



SG9 Rep
SG9
SG12 Blank
SG11 Blank
SG10 Blank
SG9 Blank
Syringe
SG8 Rep
0 10 20 30 40 50 60 70 80 90 100
SG8 Syringe
Syringe
SG7 Rep
SG7
SG6 Rep
SG6
100 90 80 70 60 50 40 30 20 10 0



SG14 Rep
100 90 80 70 60 50 40 30 20 10 0
SG14
Syringe
SG13 Rep
SG13
SG16 Blank Rep
SG16 Blank
SG15 Blank
SG12 Rep
0 SG12 20 30 40 50 60 70 80 90 100
SG14 Blank
SG13 Blank
Syringe
SG11 Rep
SG11
Syringe
SG10 Rep
SG10
Syringe
100 90 80 70 60 50 40 30 20 10 0


SG22 Blank
SG21 Blank
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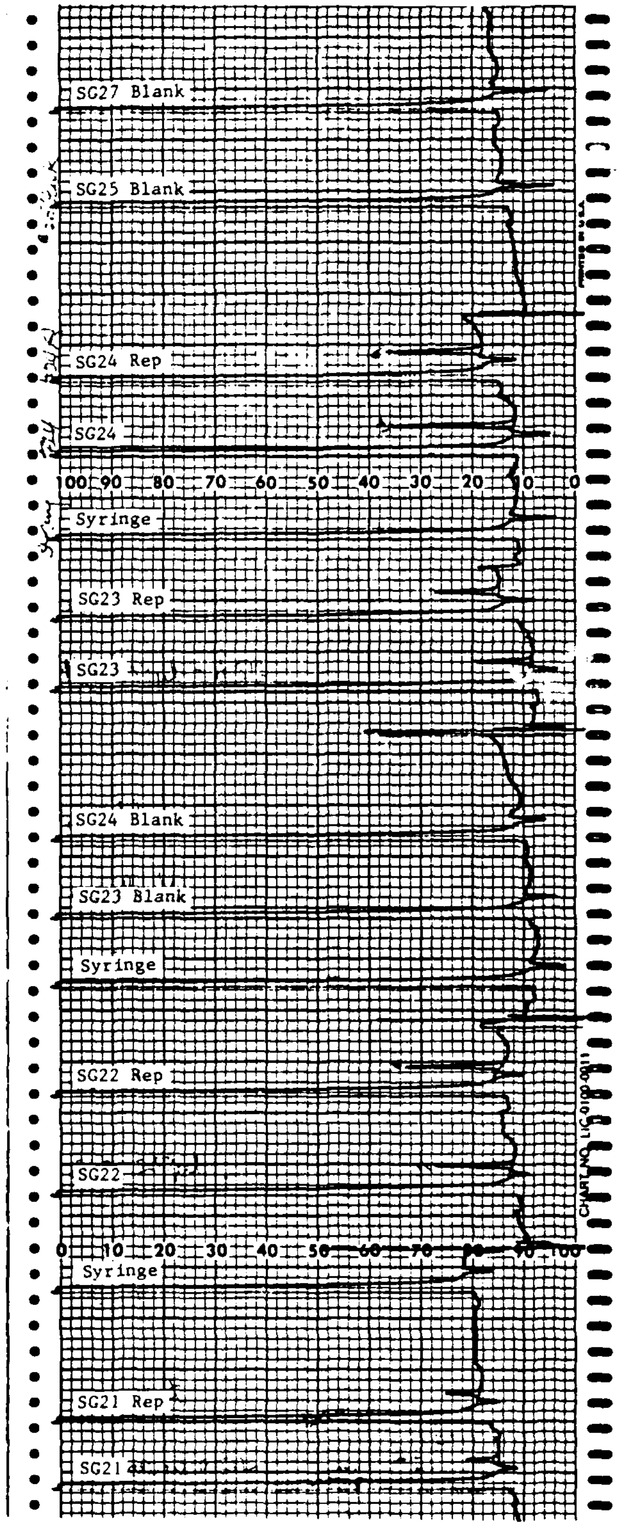
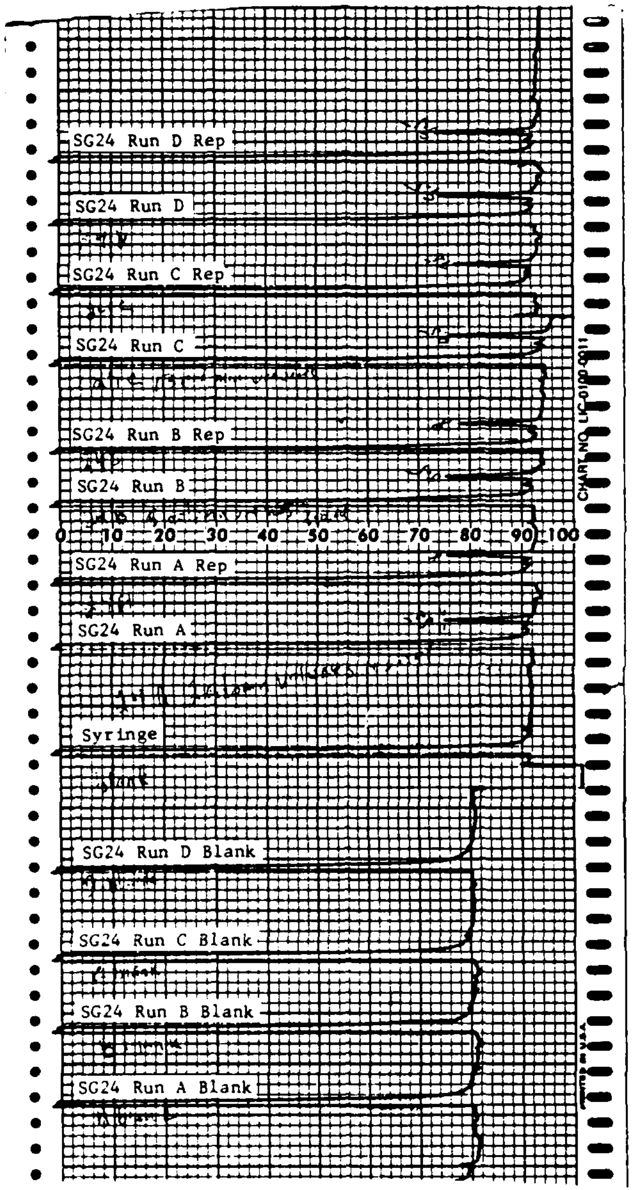
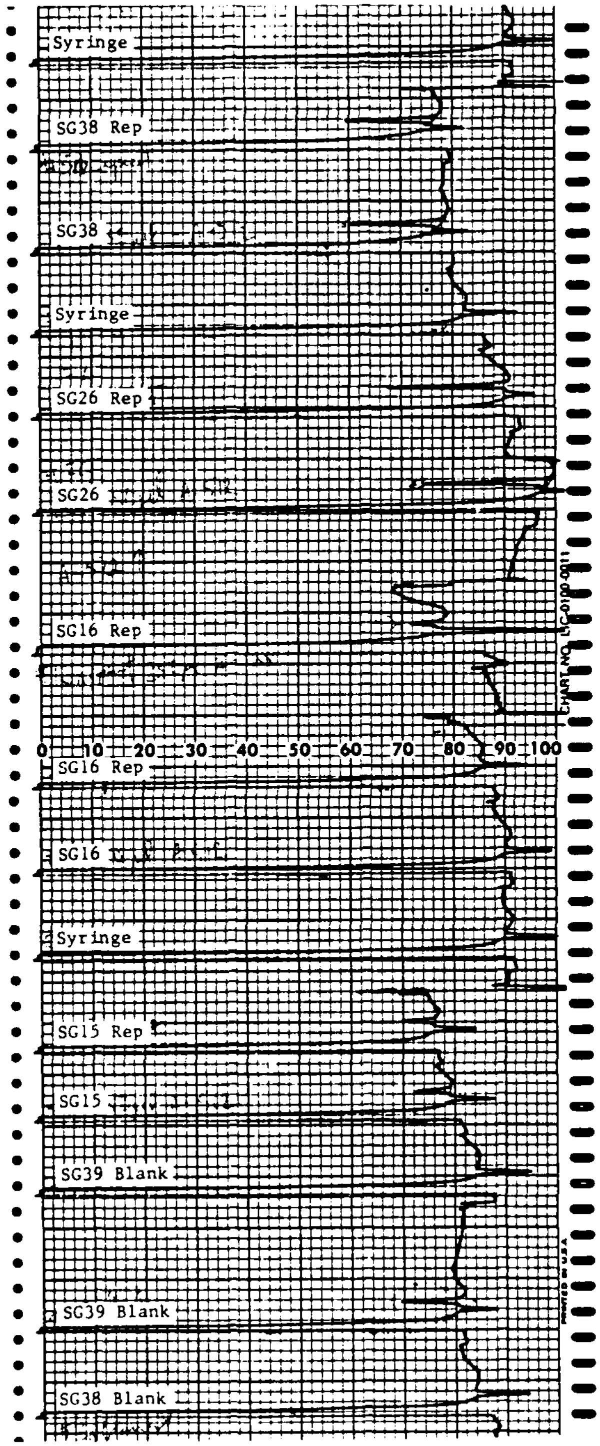
SG20 Rep
SG20
SG19 Rep
SG19
Syringe Blank
SG17 Rep
SG17
Syringe
0 10 20 30 40 50 60 70 80 90 100
SG18 Rep
SG18
SG20 Blank
SG19 Blank
SG18 Blank
SG17 Blank
CHART NO. LIC 0100-0011


SG27 Blank
SG25 Blank
SG24 Rep
SG24
100 90 80 70 60 50 40 30 20 10 0
Syringe
SG23 Rep
SG23
SG24 Blank
SG23 Blank
Syringe
SG22 Rep
SG22
0 10 20 30 40 50 60 70 80 90 100
Syringe
SG21 Rep
SG21
CHART NO. LIC 0100-0011


SG24 Run D Rep
SG24 Run D
SG24 Run C Rep
SG24 Run C
SG24 Run B Rep
SG24 Run B
0 10 20 30 40 50 60 70 80 90 100
SG24 Run A Rep
SG24 Run A
Syringe
SG24 Run D Blank
SG24 Run C Blank
SG24 Run B Blank
SG24 Run A Blank
CHART NO. LIC-0100-0011


Syringe
SG38 Rep
SG38
Syringe
SG26 Rep
SG26
SG16 Rep
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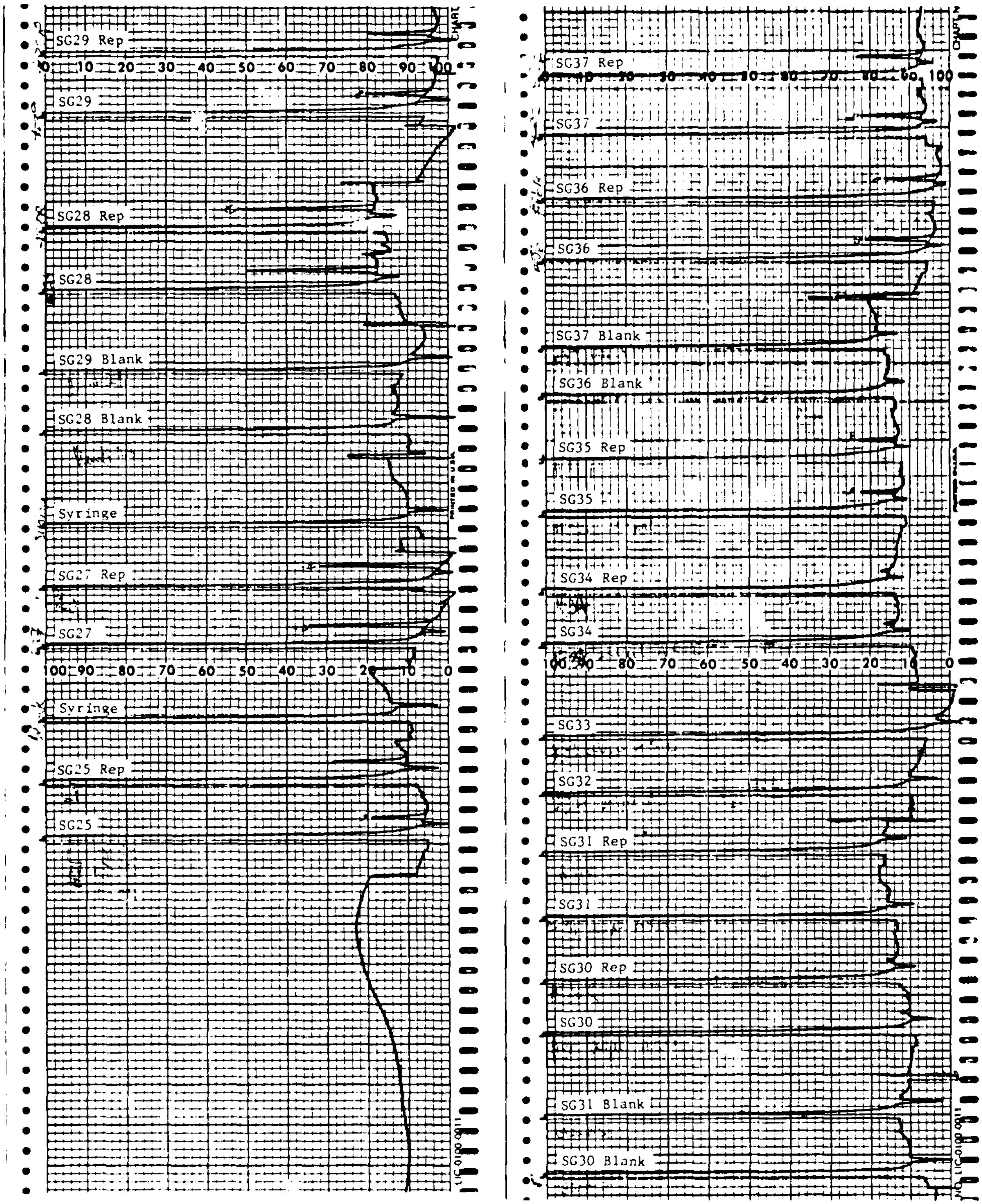
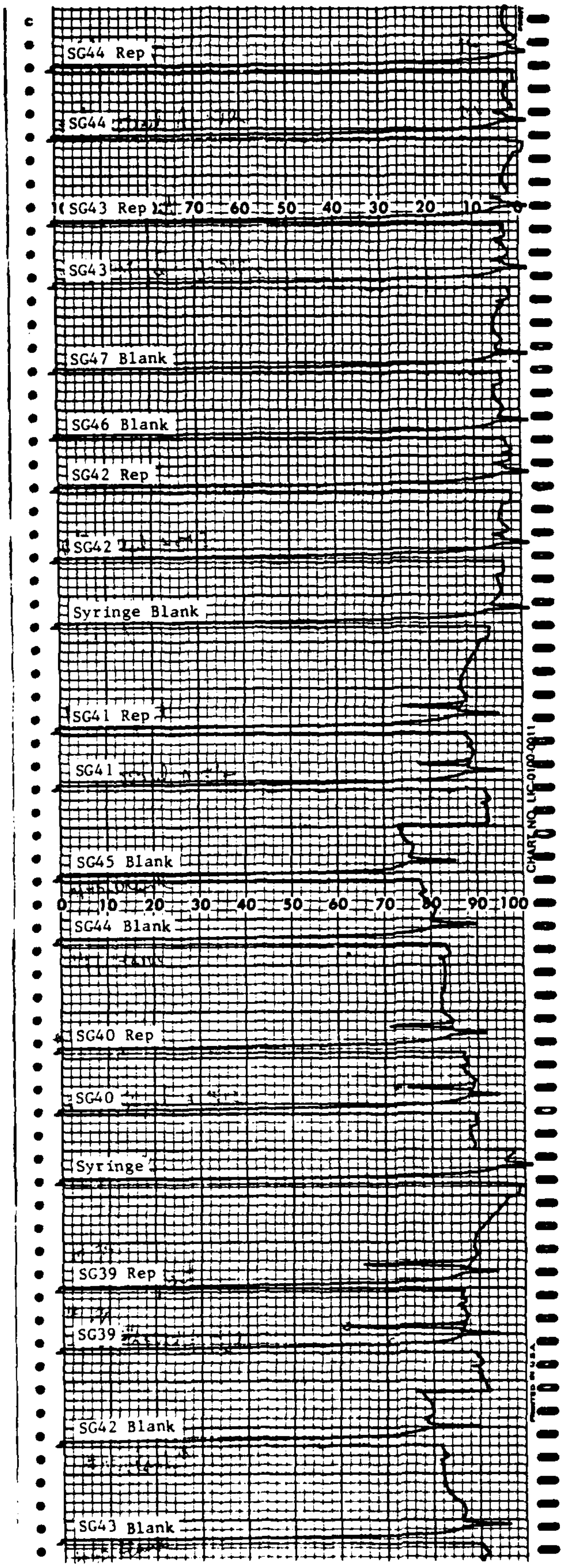
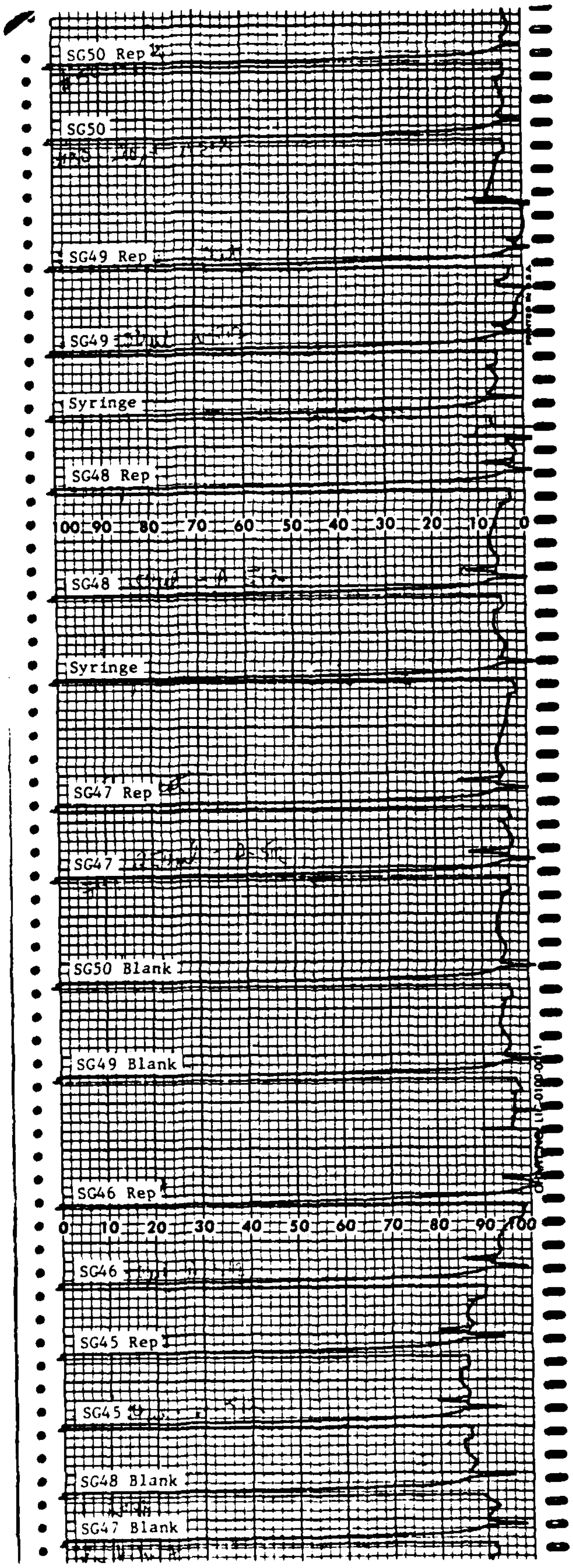
SG16 Rep
SG16
Syringe
SG15 Rep
SG15
SG39 Blank
SG39 Blank
SG38 Blank
CHART NO. LIC-0100-0011


SG29 Rep
0 10 20 30 40 50 60 70 80 90 100
SG29
SG28 Rep
SG28
SG29 Blank
SG28 Blank
Syringe
SG27 Rep
SG27
100 90 80 70 60 50 40 30 20 10 0
Syringe
SG25 Rep
SG25
SG37 Rep
SG37
SG36 Rep
SG36
SG37 Blank
SG36 Blank
SG35 Rep
SG35
SG34 Rep
SG34
100 90 80 70 60 50 40 30 20 10 0
SG33
SG32
SG31 Rep
SG31
SG30 Rep
SG30
SG31 Blank
SG30 Blank


SG44 Rep
SG44
SG43 Rep
70 60 50 40 30 20 10 0
SG43
SG47 Blank
SG46 Blank
SG42 Rep
SG42
Syringe Blank
SG41 Rep
SG41
SG45 Blank
0 10 20 30 40 50 60 70 80 90 100
SG44 Blank
SG40 Rep
SG40
Syringe
SG39 Rep
SG39
SG42 Blank
SG43 Blank
CHART NO. LIC-0100-0011


SG50 Rep
SG50
SG49 Rep
SG49
Syringe
SG48 Rep
100 90 80 70 60 50 40 30 20 10 0
SG48
Syringe
SG47 Rep
SG47
SG50 Blank
SG49 Blank
SG46 Rep
0 10 20 30 40 50 60 70 80 90 100
SG46
SG45 Rep
SG45
SG48 Blank
SG47 Blank

Appendix F.2

Trichloroethylene and 1,2-trans-dichloroethylene Stability in Groundwater

ENVIRONMENTAL RESEARCH GROUP, INC. erg™

117 N. First Ann Arbor, Michigan 48104 (313) 662-3104

ANALYTICAL RESULTS

Stability Study
Project-A3107.7, Sample 133171
(SAIC #EPA 1C-40)

Date Sampled: 07/09/85

Approved: [signature]

Date: Sept. 13, 1985

Analysis Date	Trans-1,2-Dichloroethylene	Trichloroethylene
07/15/85	36	13
08/02/85	37 (2.7%)*	14 (7.4%)*
08/09/85	37 (2.7%)*	13 (0.0%)*
08/19/85	43 (18%)*	14 (7.4%)*
08/23/85	33 (8.7%)*	10 (26%)*
Mean	37.2	12.8
Standard Deviation	3.2	1.5

Total Elasped Time from sampling to last analysis: 45 days

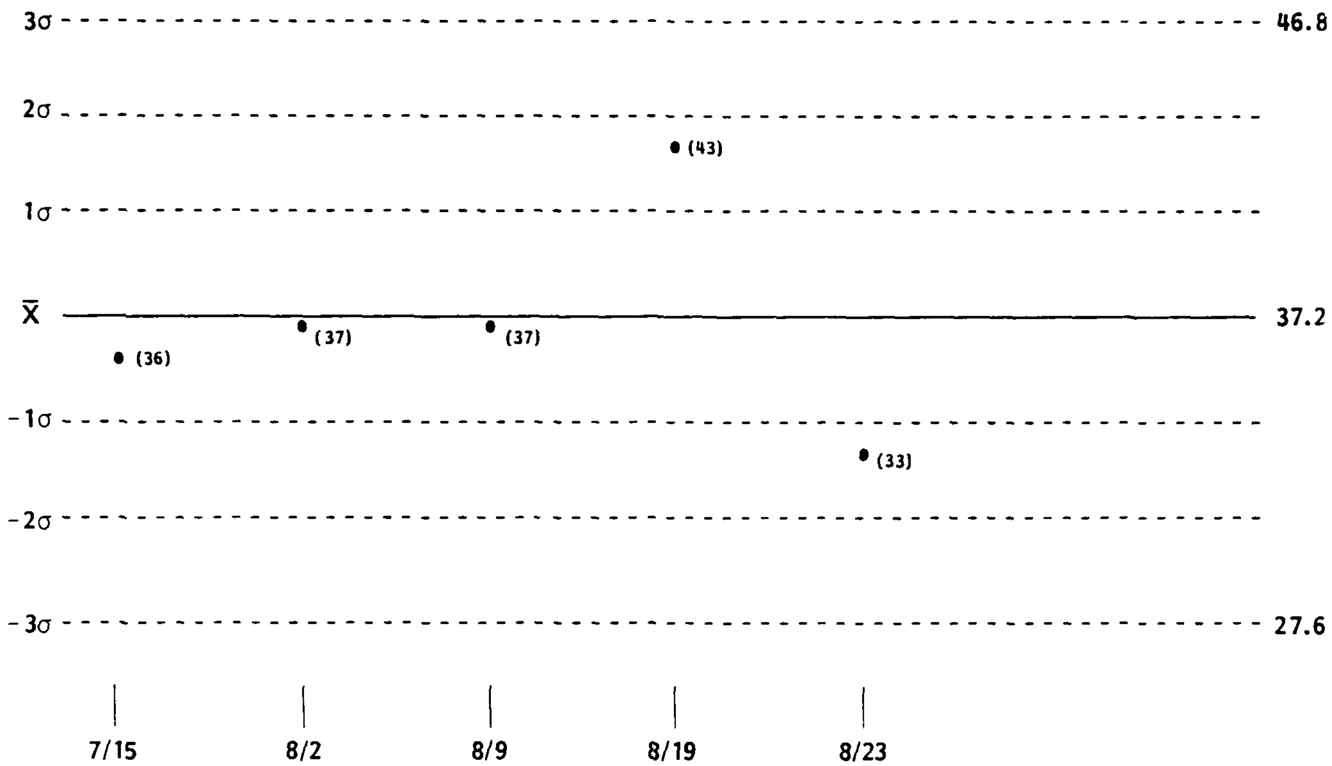
* Relative Percent Difference - based on initial analytical result.

Comments: The results of this single series of analyses would indicate that for the type of matrix involved, the above compounds have remained relatively stable in their concentration value for a period of approximately 45 days after the original sampling date.

Ann Arbor Chicago Cleveland San Francisco Minneapolis-St. Paul

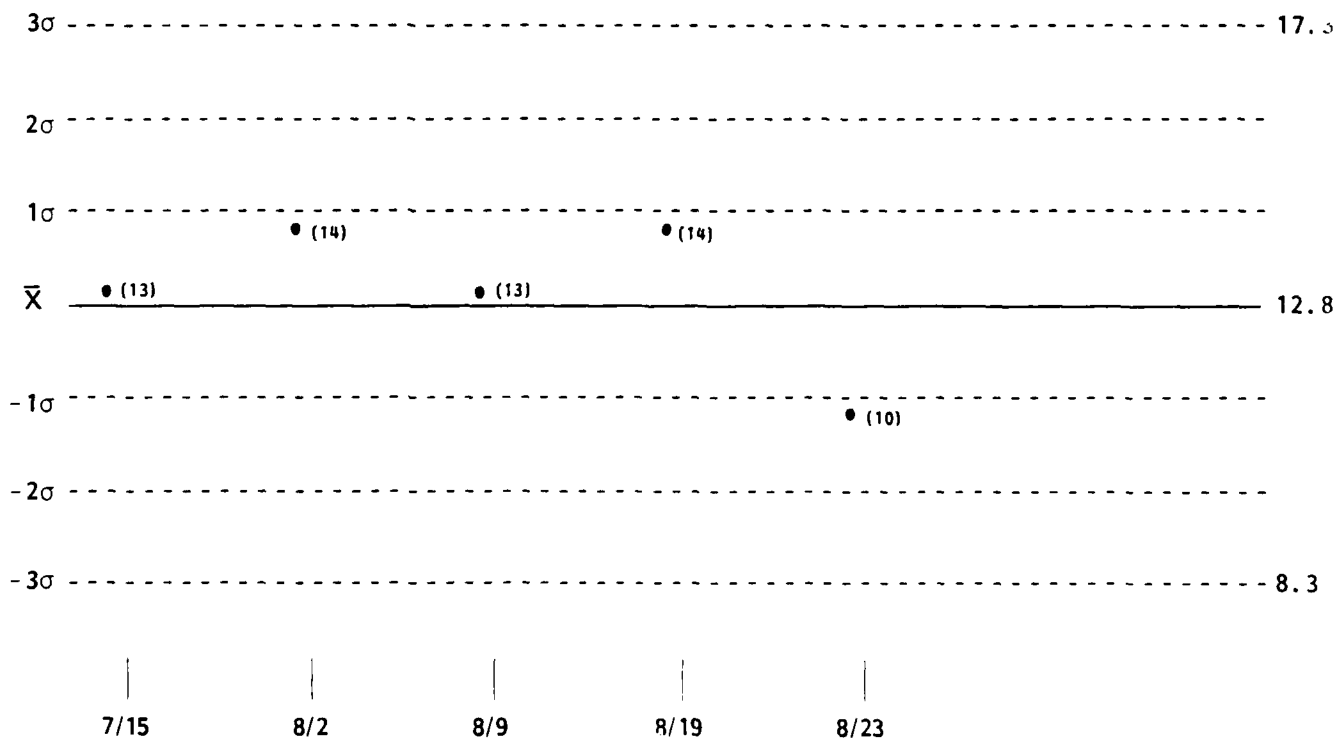
Trans-1,2-Dichloroethylene Sample #133171 (SAIC #EPA 1C-40); Original Sample Date 7/9/85

$\bar{X}$ = 37.2 σ = 3.2 (all values expressed in µg/l)



Trichloroethylene Sample #133171 (SAIC #EPA 1C-40); Original Sample Date 7/9/85

$\bar{X}$ = 12.8 σ = 1.5 (all values expressed in µg/l)



Appendix F.3

Quality Control Reports for Duplicate and Matrix Spike Analyses*

*A single QC report was prepared for each of 12 sets of water analyses.

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS

SAIC/JRB Associates A3107.1

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/L	mg/L	%	mg/L	mg/L	%
Methylene Chloride	2.6	2.6	0			
	0.00045	0.00045	0	0.096	0.120	80
1,1-dichloroethene	ND(0.00013)	ND(0.00013)	0	0.0043	0.0033	130
	ND(0.00013)	ND(0.00013)	0	0.019	0.024	79
1,1-dichloroethane	ND(0.00007)	ND(0.00007)	0	0.0058	0.0052	112
	ND(0.00007)	ND(0.00007)	0	0.023	0.024	96
Trans-1,2-dichloroethane	0.00026	0.00026	0	------	------	------
	0.031	0.033	6.2	------	------	------
Chloroform	0.00021	0.00021	0	------	------	------
	ND(0.00005)	ND(0.00005)	0	------	------	------
1,2-dichloroethane	ND(0.00003)	ND(0.00003)	0	0.0036	0.0033	109
	ND(0.00003)	ND(0.00003)	0	0.029	0.024	121
1,1,1-trichloroethane	0.00003	0.00003	0	0.0042	0.0040	105
	ND(0.00003)	ND(0.00003)	0	------	------	------
Carbon tetrachloride	ND(0.00012)	ND(0.00012)	0	------	------	------
	ND(0.00012)	ND(0.00012)	0	------	------	------
Bromodichloromethane	ND(0.0001)	ND(0.0001)	0	------	------	------
	ND(0.0001)	ND(0.0001)	0	------	------	------
Trans-1,3-dichloropropane	ND(0.00034)	ND(0.00034)	0	------	------	------
	ND(0.00034)	ND(0.00034)	0	------	------	------
Trichloroethene	0.0019	0.0019	0	0.0057	0.0038	100
	0.018	0.012	40	0.036	0.024	100
Dibromochloromethane	ND(0.00009)	ND(0.00009)	0	------	------	------
	ND(0.00009)	ND(0.00009)	0	------	------	------
1,1,2-trichloroethane	ND(0.00002)	ND(0.00002)	0	------	------	------
	ND(0.00002)	ND(0.00002)	0	------	------	------

This QC report covers the following sample numbers: 131092 - 131122

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS

SAIC/JRB Associates A3107.1

DUPLICATE				MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/L	mg/L	%			
Cis-1,3-dichloropropene	ND(0.0002)	ND(0.0002)	0			
	ND(0.0002)	ND(0.0002)	0			
Tetrachloroethene	ND(0.00003)	ND(0.00003)	0			
	ND(0.00003)	ND(0.00003)	0			
1,1,2,2-tetrachloroethane	ND(0.00003)	ND(0.00003)	0			
	ND(0.00003)	ND(0.00003)	0			
Bromoform	ND(0.0002)	ND(0.0002)	0			
	ND(0.0002)	ND(0.0002)	0			
Chlorobenzene	ND(0.00025)	ND(0.00025)	0			
	ND(0.00025)	ND(0.00025)	0			
1,3-dichlorobenzene	ND(0.00032)	ND(0.00032)	0			
	ND(0.00032)	ND(0.00032)	0			
1,2-dichlorobenzene	ND(0.00015)	ND(0.00015)	0			
	ND(0.00015)	ND(0.00015)	0			
1,4-dichlorobenzene	ND(0.00024)	ND(0.00024)	0			
	ND(0.00024)	ND(0.00024)	0			
Benzene	ND(0.0002)	ND(0.0002)	0			
	ND(0.0002)	ND(0.0002)	0			
Ethylbenzene	ND(0.0002)	ND(0.0002)	0			
	ND(0.0002)	ND(0.0002)	0			
Toluene	ND(0.0002)	ND(0.0002)	0			

This QC report covers the following sample numbers: 131092 - 131122

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS

JRB A3107.2

	DUPLICATE*			MATRIX SPIKE*		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spiked Added	Percent Recovery
	ug/l	ug/l	%	ug/l	ug/l	%
Chloromethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Bromomethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Dichlorodifluoromethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Vinyl Chloride	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Chloroethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Methylene Chloride	ND(10)	ND(10)	0			
	ND(10)	ND(10)	0			
Trichlorofluoromethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
1,1-dichloroethylene	ND(1.0)	ND(1.0)	0	28	50	56
	ND(1.0)	ND(1.0)	0	75	50	150
1,1-dichloroethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Trans-1,2-dichloroethylene	47	42	11			
	585	594	1.5			

This QC report covers the following sample numbers: 131533 - 131555
*QC done on sample 131541 and 131551

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS

JRB - A3107.2

	DUPLICATE *			MATRIX SPIKE *		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spiked Added	Percent Recovery
	ug/l	ug/l	%	ug/l	ug/l	%
Cis-1,3-Dichloropropene	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
2-Chloroethlylvinylether	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Bromoform	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
1,1,2,2-Tetrachlorethane	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Tetrachloroethylene	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Chlorobenzene	ND(1.0)	ND(1.0)	0	54	50	108
	ND(1.0)	ND(1.0)	0	52	50	104
1,3-Dichlorobenzene	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
1,2-Dichlorobenzene	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
1,4-Dichlorobenzene	ND(1.0)	ND(1.0)	0			
	ND(1.0)	ND(1.0)	0			
Benzene	ND(1.0)	ND(1.0)	0	57	50	114
	ND(1.0)	ND(1.0)	0	58	50	116

This QC report covers the following sample numbers: 131533 - 131555

*QC done on samples 131541 and 131551

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS

JRB A31073

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spiked Added	Percent Recovery
	ug/l	ug/l	%	ug/l	ug/l	%
Chloromethane	ND(1.0)	ND(1.0)	0			
Bromoethane	ND(1.0)	ND(1.0)	0			
Dichlorodifluoromethane	ND(1.0)	ND(1.0)	0			
Vinyl chloride	ND(1.0)	ND(1.0)	0			
Chloroethane	ND(1.0)	ND(1.0)	0			
Methylene chloride	ND(10)	ND(10)	0			
Trichlorofluoromethane	ND(1.0)	ND(1.0)	0			
1,1-dichloroethylene	ND(1.0)	ND(1.0)	0			
1,1-dichloroethane	ND(1.0)	ND(1.0)	0			
Trans-1,2-dichloroethylene	47	42	11	45	0	0
Chloroform	ND(1.0)	ND(1.0)	0			
1,2-dichloroethane	ND(1.0)	ND(1.0)	0			
1,1,1-trichloroethane	ND(1.0)	ND(1.0)	0			
Carbon tetrachloride	ND(1.0)	ND(1.0)	0			
Bromodichloromethane	ND(1.0)	ND(1.0)	0			
1,2-dichloropropane	ND(1.0)	ND(1.0)	0			

This QC report covers the following sample numbers: 131595 - 131602
*QC done on another sample of another project run in same sample set.

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS

JRB A3107.3

DUPLICATE				MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spiked Added	Percent Recovery
	ug/l	ug/l	%	ug/l	ug/l	%
Trans-1,3-dichloropropene	ND(1.0)	ND(1.0)	0			
Trichloroethylene	3	3	0	53	50	106
Dibromochloromethane	ND(1.0)	ND(1.0)	0			
1,1,2-trichloroethane	ND(1.0)	ND(1.0)	0			
Cis-1,3-dichloropropene	ND(1.0)	ND(1.0)	0			
2-chloroethylvinyl ethes	ND(1.0)	ND(1.0)	0			
Bromoform	ND(1.0)	ND(1.0)	0			
1,1,2,2-tetrachloroethane	ND(1.0)	ND(1.0)	0			
Tetrachloroethylene	ND(1.0)	ND(1.0)	0			
Chorobenzene	ND(1.0)	ND(1.0)	0	52	50	104
1,3-dichlorobenzene	ND(1.0)	ND(1.0)	0			
1,2-dichlorobenzene	ND(1.0)	ND(1.0)	0			
1,4-dichlorobenzene	ND(1.0)	ND(1.0)	0			
Benzene	ND(1.0)	ND(1.0)	0	57	50	114
Toluene	ND(1.0)	ND(1.0)	0	42	50	84
Ethylbenzene	ND(1.0)	ND(1.0)	0			

This QC report covers the following sample numbers: 131595 - 131602
*QC done on sample from another project done on same sample set.

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.4

Parameter	DUPLICATE Sample A	Sample B	Relative Difference	MATRIX SPIKE Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Chloromethane	ND(0.00008)	ND(0.0008)	0	-	-	-
Bromomethane	ND(0.0012)	ND(0.0012)	0	-	-	-
Dichlorodifluoromethane	ND(0.0018)	ND(0.0018)	0	-	-	-
Vinyl Chloride	ND(0.00018)	ND(0.00018)	0	-	-	-
Chloroethane	ND(0.00052)	ND(0.00052)	0	-	-	-
Methylene Chloride	0.025	0.031	21	-	-	-
Trichlorofluoromethane	ND(0.0005)	ND(0.0005)	0	-	-	-
1,1 - Dichloroethylene	0.0073	0.0071	2.8	-	-	-
1,1 - Dichloroethane	0.00064	0.00063	1.6	0.0037	0.0044	84
Trans - 1,2 - dichloroethylene	0.062	0.062	0	-	-	-
Chloroform	0.0017	0.0015	12	-	-	-
1,2 - Dichloroethane	0.00040	0.00037	7.9	0.0024	0.0027	89
1,1,1 - Trichloroethane	0.0015	0.00017	12	-	-	-
Carbon Tetrachloride	ND(0.00012)	0.00014	0	-	-	-
Bromodichloromethane	ND(0.00010)	ND(0.00010	0	-	-	-
1,2 - Dichloropropane	ND(0.00004)	ND(0.00004)	0	-	-	-
Trans - 1,3 - dichloropropane	ND(0.00032)	ND(0.00032)	0	-	-	-
Trichloroethylene	0.19	0.20	5.0	-	-	-
Dibromochloromethane	ND(0.00009)	ND(0.00009)	0	-	-	-
1,1,2 - Trichloroethane	ND(0.00002)	ND(0.00002)	0	-	-	-
Cis - 1,3 dichloropropane	ND(0.00020)	ND(0.00020)	0	-	-	-
2 - Chloroethylvinylether	ND(0.00013)	ND(0.00013)	0	-	-	-
Bromoform	ND(0.00020)	ND(0.00020)	0	-	-	-
1,1,2,2, - Tetrachloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
Tetrachloroethylene	0.0031	0.0029	6.7	-	-	-
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	-	-	-

This QC report covers the following sample numbers: 131962-131971

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.4

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
1,3 - Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	-	-	-
1,2 - Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	-	-	-
1,4 - Dichlorobenzene	ND(0.00024)	ND(0.00024)	0	-	-	-
Benzene	ND(0.00020)	ND(0.00020)	0	0.0031	0.0042	74
Toluene	ND(0.00020)	ND(0.00020)	0	0.0030	0.0043	70
Ethyl Benzene	ND(0.00020)	ND(0.00020)	0	0.0044	0.0044	100

This QC report covers the following sample numbers: 131962-131971

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.4

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Chloromethane	ND(0.00008)	-	-	-	-	-
Bromomethane	ND(0.0012)	-	-	-	-	-
Dichlorodifluoromethane	ND(0.0018)	-	-	-	-	-
Vinyl Chloride	ND(0.00018)	-	-	-	-	-
Chloroethane	ND(0.00052)	-	-	-	-	-
Methylene Chloride	0.0016	-	-	-	-	-
Trichlorofluoromethane	ND(0.00050)	-	-	-	-	-
1,1 - Dichloroethylene	ND(0.00013)	-	-	0.0024	0.0029	83
1,1 - Dichloroethane	ND(0.00007)	-	-	0.0041	0.0044	93
Trans - 1,2 - dichloroethylene	ND(0.00010)	-	-	-	-	-
Chloroform	ND(0.00005)	-	-	-	-	-
1,2 - Dichloroethane	ND(0.00003)	-	-	0.0020	0.0027	74
1,1,1 - Trichloroethane	ND(0.00003)	-	-	-	-	-
Carbon Tetrachloride	ND(0.00012)	-	-	-	-	-
Bromodichloromethane	ND(0.00010)	-	-	-	-	-
1,2 - Dichloropropane	ND(0.00004)	-	-	-	-	-
Trans - 1,3 - dichloropropane	ND(0.00032)	-	-	-	-	-
Trichloroethylene	ND(0.00012)	-	-	0.0017	0.0025	68
Dibromochloromethane	ND(0.00009)	-	-	-	-	-
1,1,2 - Trichloroethane	ND(0.00002)	-	-	-	-	-
Cis - 1,3 dichloropropane	ND(0.00020)	-	-	-	-	-
2 - Chloroethylvinylether	ND(0.00013)	-	-	-	-	-
Bromoform	ND(0.00020)	-	-	-	-	-
1,1,2,2, - Tetrachloroethane	ND(0.00003)	-	-	-	-	-
Tetrachloroethylene	ND(0.00003)	-	-	-	-	-
Chlorobenzene	ND(0.00025)	-	-	-	-	-

This QC report covers the following sample numbers: 131945-131961

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALFT A3107.4

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
1,3 - Dichlorobenzene	ND(0.00032)	-	-	-	-	-
1,2 - Dichlorobenzene	ND(0.00015)	-	-	-	-	-
1,4 - Dichlorobenzene	ND(0.00024)	-	-	-	-	-
Benzene	ND(0.00020)	-	-	0.0031	0.0042	74
Toluene	ND(0.00020)	-	-	0.0030	0.0043	70
Ethyl Benzene	ND(0.00020)	-	-	0.0044	0.0044	100

This QC report covers the following sample numbers: 131945-131961

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.5

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Methylene Chloride	ND(0.00052)	ND(0.00052)	0	0.0060	0.0066	91
1,1-dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0047	0.0061	77
1,1-dichloroethane	0.00020	0.00019	5.0	0.0060	0.0059	98
Trans-1,2-dichloroethylene	0.022	0.021	4.5	0.026	0.0063	63
Chloroform	ND(0.00005)	ND(0.00005)	0	0.0091	0.0074	123
1,1,1-trichloroethane	0.00003	0.00085	190	0.0072	0.0067	95
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0	0.0073	0.0079	92
Trichloroethylene	0.0092	0.0087	5.6	0.016	0.0073	100
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0	0.0081	0.0081	100
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	0.0047	0.0055	85
1,3-dichlorobenzene	ND(0.00032)	ND(0.00032)	0	0.0056	0.0064	88
1,2-dichlorobenzene	ND(0.00025)	ND(0.00025)	0	0.014	0.016	88
Benzene	0.00029	0.00024	12	0.0047	0.0044	100
Ethylbenzene	ND(0.002)	ND(0.002)	0	0.0038	0.0043	88

This QC report covers the following sample numbers: 131945 - 131971

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB - ALGT A3107.6

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Methylene Chloride	ND(0.00052)	ND(0.00052)	0			
1,1-Dichloroethylene	ND(0.00013)	ND(0.00013)	0			
1,1-Dichloroethane	ND(0.00007)	ND(0.00007)	0			
Trans-1,2-Dichloroethylene	0.0021	0.0020	5.0			
Chloroform	ND(0.00005)	ND(0.00005)	0			
1,1,1-Trichloroethane	ND(0.00003)	ND(0.00003)	0			
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0			
Trichloroethylene	0.021	0.020	5.0			
Tetrachloroethylene	0.00012	0.00012	0			
Chlorobenzene	ND(0.00005)	ND(0.00029	0	0.0058	0.0055	105
1,3-Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	0.0055	0.0064	86
1,2-Dichlorobenzene	ND(0.00015)	ND(0.00015)	0			
Benzene	0.0015	0.00098	43	0.0058	0.0044	98
Toluene	ND(0.0002)	ND(0.0002)	0	0.0052	0.0043	121
Ethylbenzene	ND(0.0002)	ND(0.0002)	0	0.0041	0.0043	95
1,4-Dichlorobenzene	ND(0.00024)	ND(0.00024)	0	0.015	0.016	94

This QC report covers the following sample numbers: 132712 - 132725

Ammended

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB - ALGT A3107.7

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Methylene Chloride	ND(0.00052)	ND(0.00052)	0	0.0061	0.0066	92
1,1-Dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0065	0.0061	107
1,1-Dichloroethane	ND(0.00007)	ND(0.00007)	0	0.0075	0.0059	127
Trans-1,2-Dichloroethylene	ND(0.0001)	ND(0.0001)	0	0.0083	0.0063	132
Chloroform	ND(0.00005)	ND(0.00005)	0	0.0080	0.0074	108
1,1,1-Trichloroethane	ND(0.00003)	ND(0.00003)	0	0.0079	0.0067	118
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0	0.010	0.0079	127
Trichloroethylene	ND(0.00012)	ND(0.00012)	0	0.0089	0.0073	122
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0	0.011	0.0081	136
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	0.0064	0.0055	116
1,3-Dichlorobenzene	ND(0.00034)	ND(0.00052)	0	0.0062	0.0064	97
1,2-Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	0.015	0.016	94
Benzene	ND(0.0002)	ND(0.0002)	0	0.0055	0.0044	125
Toluene	ND(0.0002)	ND(0.0002)	0	0.0049	0.0043	114
Ethylbenzene	ND(0.0002)	ND(0.0002)	0	0.0045	0.0043	105

This QC report covers the following sample numbers: 133171 - 133192

Ammended

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB - ALGT A3107.8

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Methylene Chloride	ND(0.00052)	ND(0.00052)	0			
1,1-Dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0067	0.0061	110
1,1-Dichloroethane	ND(0.00007)	ND(0.00007)	0			
Trans-1,2-Dichloroethylene	ND(0.0001)	ND(0.0001)	0			
Chloroform	ND(0.00005)	ND(0.00005)	0			
1,1,1-Trichloroethane	ND(0.00003)	ND(0.00003)	0			
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0			
Trichloroethylene	ND(0.00012)	ND(0.00012)	0			
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0			
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	0.0055	0.0055	100
1,3-Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	0.0054	0.0064	84
1,2-Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	0.014	0.016	88
Benzene	ND(0.0002)	ND(0.0002)	0	0.0056	0.0044	127
Toluene	ND(0.0002)	ND(0.0002)	0	0.0047	0.0043	109
Ethylbenzene	ND(0.0002)	ND(0.0002)	0	0.0039	0.0043	91

This QC report covers the following sample numbers: 133193 - 133205, 133213 - 133218, 133369 - 133383

Ammended

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB - ALGT A3107.8

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Methylene Chloride	ND(0.00052)	ND(0.00052)	0			
1,1-Dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0068	0.0061	111
1,1-Dichloroethane	ND(0.00007)	ND(0.00007)	0			
Trans-1,2-Dichloroethylene	ND(0.0001)	ND(0.0001)	0			
Chloroform	ND(0.00005)	ND(0.00005)	0			
1,1,1-Trichloroethane	ND(0.00003)	ND(0.00003)	0			
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0			
Trichloroethylene	ND(0.00012)	ND(0.00012)	0			
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0			
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	0.0052	0.0055	95
1,3-Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	0.0056	0.0064	88
1,2-Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	0.015	0.016	94
Benzene	ND(0.0002)	ND(0.0002)	0	0.0036	0.0044	82
Toluene	ND(0.0002)	ND(0.0002)	0	0.0042	0.0043	98
Ethylbenzene	ND(0.0002)	ND(0.0002)	0	0.0042	0.0043	98

This QC report covers the following sample numbers: 133417, 133485 - 133495, 133538 - 133548

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.9

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Chloromethane	ND(0.00008)	ND(0.00008)	0	-	-	-
Bromomethane	ND(0.0012)	ND(0.0012)	0	-	-	-
Dichlorodifluoromethane	ND(0.0018)	ND(0.0018)	0	-	-	-
Vinyl Chloride	ND(0.00018)	ND(0.00018)	0	-	-	-
Chloroethane	ND(0.00052)	ND(0.00052)	0	-	-	-
Methylene Chloride	ND(0.00025)	ND(0.00025)	0	-	-	-
Trichlorofluoromethane	ND(0.0005)	ND(0.0005)	0	-	-	-
1,1 - Dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0029	0.0032	91
1,1 - Dichloroethane	ND(0.00007)	ND(0.00007)	0	0.0031	0.0033	94
Trans - 1,2 - dichloroethylene	ND(0.00010)	ND(0.00010)	0	-	-	-
Chloroform	ND(0.00005)	ND(0.00005)	0	-	-	-
1,2 - Dichloroethane	ND(0.00003)	ND(0.00003)	0	0.0017	0.0018	94
1,1,1 - Trichloroethane	ND(0.00003)	ND(0.00003)	0	0.0023	0.0022	105
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0	-	-	-
Bromodichloromethane	ND(0.00010)	ND(0.00010)	0	-	-	-
1,2 - Dichloropropane	ND(0.00003)	ND(0.00003)	0	-	-	-
Trans - 1,3 - dichloropropane	ND(0.00003)	ND(0.00003)	0	-	-	-
Trichloroethylene	ND(0.00012)	ND(0.00012)	0	0.0013	0.0023	57
Dibromochloromethane	ND(0.00010)	ND(0.00010)	0	-	-	-
1,1,2 - Trichloroethane	ND(0.00004)	ND(0.00004)	0	-	-	-
Cis - 1,3 dichloropropane	ND(0.00020)	ND(0.00020)	0	-	-	-
2 - Chloroethylvinylether	ND(0.00013)	ND(0.00013)	0	-	-	-
Bromoform	ND(0.00020)	ND(0.00020)	0	-	-	-
1,1,2,2, - Tetrachloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0	0.0034	0.0033	103
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	-	-	-

This QC report covers the following sample numbers: 133219-133236, 133367-133368

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.9

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
1,3 - Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	-	-	-
1,2 - Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	-	-	-
1,4 - Dichlorobenzene	ND(0.00024)	ND(0.00024)	0	-	-	-
Benzene	ND(0.00020)	ND(0.00020)	0	0.017	0.021	85
Toluene	ND(0.00020)	ND(0.00020)	0	0.018	0.024	75
Ethyl Benzene	ND(0.00020)	ND(0.00020)	0	0.016	0.022	73

This QC report covers the following sample numbers: 133219-133236, 133367-133368

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC /JRB-ALGT A 3107.10

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Chloromethane	ND(0.00008)	ND(0.00008)	0	-	-	-
Bromomethane	ND(0.0012)	ND(0.0012)	0	-	-	-
Dichlorodifluoromethane	ND(0.0018)	ND(0.0018)	0	-	-	-
Vinyl Chloride	ND(0.00018)	ND(0.00018)	0	-	-	-
Chloroethane	ND(0.00052)	ND(0.00052)	0	-	-	-
Methylene Chloride	ND(0.00025)	ND(0.00025)	0	-	-	-
Trichlorofluoromethane	ND(0.0005)	ND(0.0005)	0	-	-	-
1,1 - Dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0035	0.0032	109
1,1 - Dichloroethane	ND(0.00007)	ND(0.00007)	0	0.0033	0.0033	100
Trans - 1,2 - dichloroethylene	ND(0.00010)	ND(0.00010)	0	-	-	-
Chloroform	ND(0.00005)	ND(0.00005)	0	-	-	-
1,2 - Dichloroethane	ND(0.00003)	ND(0.00003)	0	0.0019	0.0018	106
1,1,1 - Trichloroethane	0.00005	0.00004	25	0.0029	0.0022	130
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0	-	-	-
Bromodichloromethane	ND(0.00010)	ND(0.00010)	0	-	-	-
1,2 - Dichloropropane	ND(0.00004)	ND(0.00004)	0	-	-	-
Trans - 1,3 - dichloropropane	ND(0.00032)	ND(0.00032)	0	-	-	-
Trichloroethylene	0.0028	0.0016	55	0.0035	0.0023	83
Dibromochloromethane	ND(0.00009)	ND(0.00009)	0	-	-	-
1,1,2 - Trichloroethane	ND(0.00002)	ND(0.00002)	0	-	-	-
Cis - 1,3 dichloropropane	ND(0.00020)	ND(0.00020)	0	-	-	-
2 - Chloroethylvinylether	ND(0.00013)	ND(0.00013)	0	-	-	-
Bromoform	ND(0.00020)	ND(0.00020)	0	-	-	-
1,1,2,2, - Tetrachloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0	0.0039	0.0033	118
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	-	-	-

This QC report covers the following sample numbers: 133430-133442

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A 3107.10

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
1,3 - Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	-	-	-
1,2 - Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	-	-	-
1,4 - Dichlorobenzene	ND(0.00024)	ND(0.00024)	0	-	-	-
Benzene	0.00024	0.00024	0	0.0033	0.0042	79
Toluene	ND(0.00020)	ND(0.00020)	0	0.0040	0.0043	93
Ethyl Benzene	ND(0.00020)	ND(0.00020)	0	0.0046	0.00044	105

This QC report covers the following sample numbers: 133430-133442

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A3107.11

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Chloromethane	ND(0.00008)	ND(0.00008)	0	-	-	-
Bromomethane	ND(0.0012)	ND(0.0012)	0	-	-	-
Dichlorodifluoromethane	ND(0.0018)	ND(0.0018)	0	-	-	-
Vinyl Chloride	ND(0.00018)	ND(0.00018)	0	-	-	-
Chloroethane	ND(0.00052)	ND(0.00052)	0	-	-	-
Methylene Chloride	ND(0.00025)	ND(0.00025)	0	-	-	-
Trichlorofluoromethane	ND(0.0005)	ND(0.0005)	0	-	-	-
1,1 - Dichloroethylene	ND(0.00013)	ND(0.00013)	0	-	-	-
1,1 - Dichloroethane	ND(0.00007)	ND(0.00007)	0	-	-	-
Trans - 1,2 - dichloroethylene	ND(0.00010)	ND(0.00010)	0	-	-	-
Chloroform	ND(0.00005)	ND(0.00005)	0	-	-	-
1,2 - Dichloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
1,1,1 - Trichloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0	-	-	-
Bromodichloromethane	ND(0.00010)	ND(0.00010)	0	-	-	-
1,2 - Dichloropropane	ND(0.00004)	ND(0.00004)	0	-	-	-
Trans - 1,3 - dichloropropane	ND(0.00032)	ND(0.00032)	0	-	-	-
Trichloroethylene	0.00099	0.00081	20	-	-	-
Dibromochloromethane	ND(0.00009)	ND(0.00009)	0	-	-	-
1,1,2 - Trichloroethane	ND(0.00002)	ND(0.00002)	0	-	-	-
Cis - 1,3 dichloropropane	ND(0.00020)	ND(0.00020)	0	-	-	-
2 - Chloroethylvinylether	ND(0.00013)	ND(0.00013)	0	-	-	-
Bromoform	ND(0.00020)	ND(0.00020)	0	-	-	-
1,1,2,2, - Tetrachloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
Tetrachloroethylene	ND(0.00003)	ND(0.00003)	0	-	-	-
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	0.013	0.011	118

This QC report covers the following sample numbers: 113760-133766

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
SAIC/JRB-ALGT A 3107.11

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
1,3 - Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	0.015	0.013	115
1,2 - Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	-	-	-
1,4 - Dichlorobenzene	ND(0.00024)	ND(0.00024)	0	0.026	0.033	79
Benzene	0.00063	0.0010	45	0.0087	0.0088	92
Toluene	ND(0.00020)	ND(0.00020)	0	0.0079	0.0087	91
Ethyl Benzene	ND(0.00020)	ND(0.00020)	0	0.0073	0.0087	84

This QC report covers the following sample numbers: 133760-133766

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
JRB/SAIC-ALGT ~~A3314~~
A3107.12

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
Chloromethane	ND(0.00008)	ND(0.00008)	0	-	-	-
Bromomethane	ND(0.0012)	ND(0.0012)	0	-	-	-
Dichlorodifluoromethane	ND(0.0018)	ND(0.0018)	0	-	-	-
Vinyl Chloride	ND(0.00018)	ND(0.00018)	0	-	-	-
Chloroethane	ND(0.00052)	ND(0.00052)	0	-	-	-
Methylene Chloride	ND(0.00052)	ND(0.00052)	0	0.0083	0.0066	126
Trichlorofluoromethane	ND(0.00050)	ND(0.00050)	0	-	-	-
1,1 - Dichloroethylene	ND(0.00013)	ND(0.00013)	0	0.0054	0.0061	89
1,1 - Dichloroethane	ND(0.00007)	ND(0.00007)	0	0.0060	0.0059	102
Trans - 1,2 - dichloroethylene	0.012	0.013	8.3	-	-	-
Chloroform	ND(0.00005)	ND(0.00005)	0	0.0088	0.0074	119
1,2 - Dichloroethane	ND(0.00003)	ND(0.00003)	0	0.0073	0.0063	116
1,1,1 - Trichloroethane	0.0047	0.0046	2.2	-	-	-
Carbon Tetrachloride	ND(0.00012)	ND(0.00012)	0	0.0071	0.0079	104
Bromodichloromethane	ND(0.00010)	ND(0.00010)	0	-	-	-
1,2 - Dichloropropane	ND(0.00004)	ND(0.00004)	0	0.0068	0.0058	117
Trans - 1,3 - dichloropropane	ND(0.00034)	ND(0.00034)	0	0.0060	0.0059	102
Trichloroethylene	0.19	0.20	5.0	-	-	-
Dibromochloromethane	ND(0.00009)	ND(0.00009)	0	-	-	-
1,1,2 - Trichloroethane	ND(0.00002)	ND(0.00002)	0	-	-	-
Cis - 1,3 dichloropropane	ND(0.00020)	ND(0.00020)	0	-	-	-
2 - Chloroethylvinylether	ND(0.00013)	ND(0.00013)	0	-	-	-
Bromoform	ND(0.00020)	ND(0.00020)	0	-	-	-
1,1,2,2, - Tetrachloroethane	ND(0.00003)	ND(0.00003)	0	-	-	-
Tetrachloroethylene	0.00042	0.00043	2.3	-	-	-
Chlorobenzene	ND(0.00025)	ND(0.00025)	0	0.0050	0.0055	91

This QC report covers the following sample numbers: 135164-135171

QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE ANALYSIS
JRB/SAIC-ALGT ~~A 3314~~
A3107.12

	DUPLICATE			MATRIX SPIKE		
Parameter	Sample A	Sample B	Relative Difference	Spiked Sample	Spike Added	Percent Recovery
	mg/l	mg/l	%	mg/l	mg/l	%
1,3 - Dichlorobenzene	ND(0.00032)	ND(0.00032)	0	0.0054	0.0064	84
1,2 - Dichlorobenzene	ND(0.00015)	ND(0.00015)	0	0.014	0.016	88
1,4 - Dichlorobenzene	ND(0.00024)	ND(0.00024)	0	-	-	-
Benzene	ND(0.0002)	ND(0.0002)	0	-	-	-
Toluene	ND(0.0002)	ND(0.0002)	0	0.0047	0.0043	109
Ethyl Benzene	ND(0.0002)	ND(0.0002)	0	0.0041	0.0043	95

This QC report covers the following sample numbers: 135164-135171

Appendix F.4

Analytical Reports for Water Samples to Determine the Presence of Volatile Organic Chemicals Using EPA Methods 601 and 602

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.1

Report Date: 07/05/85

Results by Sample

Prepared for:
SCIENCE APPLICATIONS INTERNATIONAL COR
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860015-90
Report #: 137
Samples Rec'd: 06-05-85
SAMPLE DATE: 06-03-85

Approved: [signature]
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID / ERG Sample Number / Matrix / Parameter	DZ03-40 06/131092 NATURAL WATER	DZ03-13 06/131093 NATURAL WATER	DZ09-53 06/131094 NATURAL WATER	DZ09-13 ~~DZ09-16~~ 06/131095 NATURAL WATER	DR05 PUMP 06/131096 NATURAL WATER	DZ10-13 06/131097 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00032)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00015)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	2.6	6.5	6.3	4.5	6.7	7.5
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	0.0015	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.00026	ND (0.0001)	0.51	0.11	0.011	ND (0.0001)
CHLOROFORM mg/L	0.00021	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.00003	ND (0.00003)	0.00007	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0019	0.0007	0.084	0.026	0.0081	0.00054
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.0067	0.0025	0.0023	0.0013	0.00047
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.1

Report Date: 05 JUL 1985

Client ID ERG Sample Number Matrix Parameter	DZ10-63 06/131098 NATURAL WATER	DZ11-33 06/131099 NATURAL WATER	DZ13-25 06/131100 NATURAL WATER	DZ07-30 06/131101 NATURAL WATER	DZ12-73 06/131102 NATURAL WATER	DZ08-22 06/131103 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	2.6	6.9	4.5	7.2	71	6.8
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.026	0.24	0.19	0.0053
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	0.0001	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.00086
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0058	ND (0.00012)	0.011	0.041	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.00047	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols CONTINUED

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID ERG Sample Number Matrix Parameter	DR01 PUMP 06/131104 NATURAL WATER	AZ07-58 06/131105 NATURAL WATER	AZ08-38.0 06/131106 NATURAL WATER	AZ09-28.0 06/131107 NATURAL WATER	AZ09-58.0 06/131108 NATURAL WATER	6420 06/131109 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.00045	8	6.9	5.8	5.5	0.0017
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.038	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.032	0.35	0.0051	ND (0.0001)	0.0068	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.015	0.058	0.0083	0.0021	0.0017	0.00047
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.088	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.1

Report Date: 05 JUL 1985

Client ID ERG Sample Number Matrix Parameter	6420R 06/131110 NATURAL WATER	6408 06/131111 NATURAL WATER	6408R 06/131112 NATURAL WATER	6712 06/131113 NATURAL WATER	6712R 06/131114 NATURAL WATER	15020 WOODBROOK 06/131115 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.00022	0.00027	0.00039	0.00042	0.00048	0.00059
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	0.0002	0.00016	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0002	0.0002	0.00022	0.00029	0.00034	0.00034
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols CONTINUED

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ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.1

Report Date: 05 JUL 1985

Client ID	6821	6614	6416	6004	DRO2-PUMP	6615 WOODBROOK TERRACE
ERG Sample Number	06/131116	06/131117	06/131118	06/131119	06/131120	06/131121
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00024)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.00051	0.00059	0.00044	0.00081	0.0015	0.0012
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00026	0.0002	0.00016	0.00018	ND (0.00012)	0.00026
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.000[illegible]
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	6817
ERG Sample Number	06/131122
Matrix	NATURAL WATER
Parameter	
PURGEABLE AROMATICS	
BENZENE mg/L	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)
TOLUENE mg/L	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)
PURGEABLES, 601	
CHLOROMETHANE mg/L	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.00042
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00061
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)

Note _ Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
\- = Test not requested for this sample

Project: A3107.101

ANALYTICAL REPORT

erg
ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Report Date: 08/02/85
SECOND COLUMN CONFIRMATION

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD W. GREILING

Client P.O.: 16-860015-90
Report #: 184
Samples Rec'd: 06-28-85

Approved: [signature]
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID ERG Sample Number Matrix Parameter	DZ03-40 06/132457 NATURAL WATER	DZ03-13 06/132458 NATURAL WATER	DZ09-53 06/132459 NATURAL WATER	DZ09-13 ~~DZ09-16~~ 06/132460 NATURAL WATER	DR05-PUMP 06/132461 NATURAL WATER	DZ10-13 06/132462 NATURAL WATER
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	14	15	12	9.7	16	15
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	*	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	*	*	*	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLOROETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	*	ND (0.00012)	*	*	*	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.0067	0.0013	0.0082	0.0053	ND (0.00003)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols CONTINUED

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 02 AUG 1985
SECOND COLUMN CONFIRM.)

Client ID ERG Sample Number Matrix Parameter	DZ10-63 06/132463 NATURAL WATER	DZ11-33 06/132464 NATURAL WATER	DZ13-25 06/132465 NATURAL WATER	DZ07-30 06/132466 NATURAL WATER	DZ12-73 06/132467 NATURAL WATER	DZ08-22 06/132468 NATURAL WATER
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	2.2	13	16	17	23	22
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	*	*	*	*
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	*	*	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols

CONTINUED

erg ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 02 AUG 1985
SECOND COLUMN CONFIRM.

Client ID	DR01-PUMP	AZ07-58	AZ08-38.0	AZ09-28.0	AZ09-58.0	6004
ERG Sample Number	06/132469	06/132470	06/132471	06/132472	06/132473	06/132474
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.0013)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	28	14	15	12	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	*	*	*	*	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	*	*	*	*	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.015	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols

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ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 02 AUG 1985
SECOND COLUMN CONFIRMATION

Client ID	DR02-PUMP
ERG Sample Number	06/132475
Matrix	NATURAL WATER
Parameter	
PURGEABLES, 601	
CHLOROMETHANE mg/L	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)
CHLOROBENZENE mg/L	ND (0.00025)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)

Project Comments:

JRB-AMERICAN LAKE GARDEN TRACT.
Comments about sample 06/132457
PURGEABLES, 601 - *COMPOUND WAS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE QUANTITY OF METHYLENE CHLORIDE.
Comments about sample 06/132459
PURGEABLES, 601 - *COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.
Comments about sample 06/132460
PURGEABLES, 601 - *COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.
Comments about sample 06/132461
PURGEABLES, 601 - *COMPOUNDS PRESENT BUT NOT QUANITFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

 See last page for explanation of symbols CONTINUED

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 02 AUG 1705
SECOND COLUMN CONFIRMATION

Comments about sample 06/132465
PURGEABLES, 601 - #COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Comments about sample 06/132466
PURGEABLES, 601 - #COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Comments about sample 06/132467
PURGEABLES, 601 - #COMPOUND PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Comments about sample 06/132468
PURGEABLES, 601 - #COMPOUND PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Comments about sample 06/132469
PURGEABLES, 601 - #COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO UNIDENTIFIED INTERFERENCE.

Comments about sample 06/132470
PURGEABLES, 601 - #COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Comments about sample 06/132471
PURGEABLES, 601 - #COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Comments about sample 06/132472
PURGEABLES, 601 - #COMPOUNDS PRESENT BUT NOT QUANTIFIABLE DUE TO LARGE AMOUNT OF METHYLENE CHLORIDE.

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.2

Report Date: 07/02/85

Results by Sample

Prepared for:
SCIENCE APPLICATIONS INTERNATIONAL COR
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD W. GREILING

Client P.O.: 16-860015-90
Report #: 129
Samples Rec'd: 06-12-85
SAMPLE DATES: 06-10/11-85

Approved: [signature]
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID / Collected / ERG Sample Number / Matrix / Parameter	6B-38 / 06-11-85 / 06/131533 / NATURAL WATER	8B-32 / 06-11-85 / 06/131534 / NATURAL WATER	6A-52 / 06-11-85 / 06/131535 / NATURAL WATER	8A-46 / 06-11-85 / 06/131536 / NATURAL WATER	6A-52-QC / 06-11-85 / 06/131537 / NATURAL WATER	7B-32 / 06-11-85 / 06/131538 / NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.0036	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols CONTINUED

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID Collected ERG Sample Number Matrix Parameter	4A-117 06-11-85 06/131539 NATURAL WATER	7A-60 06-11-85 06/131540 NATURAL WATER	4C-35 06-11-85 06/131541 NATURAL WATER	4B-74 06-11-85 06/131542 NATURAL WATER	5-43 06-11-85 06/131543 NATURAL WATER	AZ09-28 06-10-85 06/131544 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0026	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.047	0.019	0.0046	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.003	0.0011	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols CONTINUED

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID Collected ERG Sample Number Matrix Parameter	DZ10-63 06/131545 NATURAL WATER	DZ10-13 06-10-85 06/131546 NATURAL WATER	DZ11-33 06-10-85 06/131547 NATURAL WATER	AZ09-58 06-10-85 06/131548 NATURAL WATER	DZ09-53 06-10-85 06/131549 NATURAL WATER	DZ12-73 06-10-85 06/131550 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.89	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROFROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.071	ND (0.00012)
DIBRCMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols CONTINUED

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.2

Report Date: 02 JUL 1985

Client ID	DZ09-13	AZ08-3B	DZ12-73-GC	AZ07-5B	4A-117-GC
Collected	06-10-85	06-10-85	06-10-85	06-10-85	06-11-85
ERG Sample Number	06/131551	06/131552	06/131553	06/131554	06/131555
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter					
PURGEABLE AROMATICS					
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601					
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.59	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.04	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

Note: Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged
SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

117 N. FIRST
ANN ARBOR, MICHIGAN 48104 (313) 662-3104

Project: A3107.202
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

Client P.O. CONTRACT
Report: 14257

Client:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Samples Recvd: 08-07-85
Refer Questions To:
THOMAS CULLEN JR

Approved: Thomas Cullen Jr.

***
Residual Samples Will Be Held
TWO WEEKS
***

WELL ID: 6A-52 QC
Client I.D.: 131537
ERG Sample No.: 08/134428
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLE AROMATICS		
BENZENE	2.0	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L
ETHYLBENZENE	ND (0.20)	ug/L
TOLUENE	ND (0.20)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L

WELL ID: 4C-35
Client I.D.: 131541
ERG Sample No.: 08/134429
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L
TRANS-1,2-DICHLOROETHYLENE	9.6	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	4.6	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L

 See last page for explanation of symbols.

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.202
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

WELL ID: 4C-35 (CONT.)
Client I.D.: 131541
ERG Sample No.: 08/134429
Matrix: NATURAL WATER

Parameter	Result	Units
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	ND (0.03)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

WELL ID: 4B-74
Client I.D.: 131542
ERG Sample No.: 08/134430
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L
TRANS-1,2-DICHLOROETHYLENE	2.3	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	6.0	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	4.5	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	ND (0.03)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

 See last page for explanation of symbols.

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.202
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

WELL ID: DZ09-53
Client I.D.: 131549
ERG Sample No.: 08/134431
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.40)	ug/L
BROMOMETHANE	ND (6.0)	ug/L
DICHLORODIFLUOROMETHANE	ND (9.0)	ug/L
VINYL CHLORIDE	ND (0.90)	ug/L
CHLOROETHANE	ND (2.6)	ug/L
METHYLENE CHLORIDE	ND (1.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (2.5)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.65)	ug/L
DICHLOROETHANE, 1,1-	ND (0.35)	ug/L
TRANS-1,2-DICHLOROETHYLENE	160	ug/L
CHLOROFORM	ND (0.25)	ug/L
DICHLORETHANE, 1,2-	ND (0.15)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.15)	ug/L
CARBON TETRACHLORIDE	ND (0.60)	ug/L
BROMODICHLOROMETHANE	ND (0.50)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.20)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (1.7)	ug/L
TRICHLOROETHYLENE	98	ug/L
DIBROMOCHLOROMETHANE	ND (0.45)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.10)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (1.0)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.65)	ug/L
BROMOFORM	ND (1.0)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.15)	ug/L
TETRACHLOROETHYLENE	ND (0.15)	ug/L
CHLOROBENZENE	ND (1.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (1.6)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.75)	ug/L
DICHLOROBENZENE, 1,4-	ND (1.2)	ug/L

WELL ID: DZ09-13
Client I.D.: 131551
ERG Sample No.: 08/134432
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.40)	ug/L
BROMOMETHANE	ND (6.0)	ug/L
DICHLORODIFLUOROMETHANE	ND (9.0)	ug/L
VINYL CHLORIDE	ND (0.90)	ug/L
CHLOROETHANE	ND (2.6)	ug/L
METHYLENE CHLORIDE	39	ug/L
TRICHLOROFLUOROMETHANE	ND (2.5)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.65)	ug/L
DICHLOROETHANE, 1,1-	ND (0.35)	ug/L

See last page for explanation of symbols.

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.202
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

WELL ID: DZ09-13 CONT
Client I.D.: 131551
ERG Sample No.: 08/134432
Matrix: NATURAL WATER

Parameter	Result	Units
TRANS-1,2-DICHLOROETHYLENE	95	ug/L
CHLOROFORM	ND (0.25)	ug/L
DICHLORETHANE, 1,2-	ND (0.15)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.15)	ug/L
CARBON TETRACHLORIDE	ND (0.60)	ug/L
BROMODICHLOROMETHANE	ND (0.50)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.20)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (1.7)	ug/L
TRICHLOROETHYLENE	48	ug/L
DIBROMOCHLOROMETHANE	ND (0.45)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.10)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (1.0)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.65)	ug/L
BROMOFORM	ND (1.0)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.15)	ug/L
TETRACHLOROETHYLENE	ND (0.15)	ug/L
CHLOROBENZENE	ND (1.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (1.6)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.75)	ug/L
DICHLOROBENZENE, 1,4-	ND (1.2)	ug/L

SD-Sample damaged
FR-See field report for result
SR-See attached report
NA-Result not applicable to test

ND-Nondetected, Detection limit in ()
<-Positive result at an unquantifiable concentration below indicated level

Thank you for your business.

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.3

Report Date: 07/02/85

Results by Sample

Prepared for:
SCIENCE APPLICATIONS INTERNATIONAL COR
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention. RICHARD GREILING

Client P.O.: 16-860015-90
Report #: 130
Samples Rec'd: 06-13-85
SAMPLE DATES: 06-11-85

Approved: [signature]
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	DZ08-22	DZ13-25	1B-78 ~~W1-B-78~~ Rg	1C-40 ~~W1-C-40~~ Rg	2A-38 ~~W2-A-38~~ Rg	2B-19 ~~W2-B-19~~ Rg
Collected	06-11-85	06-11-85	06-11-85	06-11-85	06-11-85	06-11-85
ERG Sample Number	06/131595	06/131596	06/131597	06/131598	06/131599	06/131600
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.028	0.016	0.091	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	0.001	0.001	0.001	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.008	0.001	0.011	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.3

Report Date: 02 JUL 198?

Client ID	3A-43 ~~W3-A-43~~ Rg	1C-40 (QC) ~~W7-A-40~~ Rg
Collected	06-11-85	06-11-85
ERG Sample Number	06/131601	06/131602
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ND (0.0002)	ND (0.0002)
1,2-DICHLOROBENZENE mg/L	ND (0.00015)	ND (0.00015)
1,3-DICHLOROBENZENE mg/L	ND (0.00032)	ND (0.00032)
1,4-DICHLOROBENZENE mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.003	0.092
CHLOROFORM mg/L	0.001	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.012
DIBROMOCHLOROMETHANE mg/L	ND (0.000[illegible])	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	0.001	ND (0.00002)
CIS-1,3-DICHLORPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	0.002	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST
ANN ARBOR, MICHIGAN 48104 (313) 662-3104

Project: A3107.303
Report Date: 07-30-85
SECOND COLUMN CONFIRMATION

Client P.O. 16-860015-90
Report: 14150

Samples Recvd: 06-28-85
Refer Questions To:
CAROLYN NOACK

Client:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD W. GREILING

Approved: Thomas J. Cull Jr.

***
Residual Samples Will Be Held
TWO WEEKS
***

Client I.D.: DZ13-2S
ERG Sample No.: 06/132476
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	34	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	0.26	ug/L
TRANS-1,2-DICHLOROETHYLENE	46	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	0.10	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	10	ug/L
DIBROMOCHLOROMETHANE	*	
TRICHLOROETHANE, 1,1,2-	*	
CIS-1,3-DICHLORPROPENE	*	
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	0.17	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

Comments: *UNRESOLVED AT 0.05 ug/L.

 See last page for explanation of symbols.

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.303
Report Date: 07-30-85
SECOND COLUMN CONFIRMATION

Client I.D.: ~~W1-C-40~~ 1C-40 Kg
ERG Sample No.: 06/132477
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	95	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	0.28	ug/L
TRANS-1,2-DICHLOROETHYLENE	48	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	0.08	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	4.7	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLORPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	0.53	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

Project Notes: JRB-AMERICAN LAKE GARDEN TRACT.

SD-Sample damaged
FR-See field report for result
SR-See attached report
NA-Result not applicable to test

ND-Nondetected, Detection limit in ()
<-Positive result at an unquantifiable concentration below indicated level

Thank you for your business.

erg

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.303A

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: CONTRACT
Report #: 214
Samples Rec'd: 08-13-85
SAMPLE DATE: 06-11-85

Approved: Thomas Cullen
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

	W1B-78	W1C-40 (QC)
Client ID	131597	131602
ERG Sample Number	08/134804	08/134805
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ND (0.0002)	0.00039
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.011	0.03
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	0.00026	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.001	0.017
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYL VINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00013)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00013)

 See last page for explanation of symbols

CONTINUED

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.303A

Report Date: 14 AUG 1985

Note _ Results indicated by '@' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

Project: A3107.4

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Report Date: 07/31/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD M. GREILING

Client P.O.: 16-860015-90
Report #: 169
Samples Rec'd: 06-19-85
SAMPLE DATES: 06-17/18/19-85

Approved: [signature]
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID Collected ERG Sample Number Matrix Parameter	AZ07-58 06-18-85 06/131945 NATURAL WATER	DZ12-73 06-18-85 06/131946 NATURAL WATER	AZ09-28 06-18-85 06/131947 NATURAL WATER	AZ08-38 06-18-85 06/131948 NATURAL WATER	DZ10-13 (QC) ~~LZ10-13~~ 06-18-85 06/131949 NATURAL WATER	DZ09-53 06-18-85 06/131950 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	0.00031	ND (0.0002)	0.0012	ND (0.0002)	0.00033	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.0022	0.0081	0.00083	0.0011	ND (0.00025)	0.00052
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	0.0014
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.0093
TRANS-1,2-DICHLOROETHYLENE mg/L	0.0029	ND (0.0001)	0.00065	ND (0.0001)	ND (0.0001)	0.55
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00017
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0012
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.001
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00063	0.00011	ND (0.00012)	0.0012	0.00046	0.074
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00003	ND (0.00003)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	DZ09-13	DZ11-33	DZ10-63	AZ09-58	DZ10-13	DZ13-25
Collected	06-18-85	06-18-85	06-18-85	06-18-85	06-18-85	06-18-85
ERG Sample Number	06/131951	06/131952	06/131953	06/131954	06/131955	06/131956
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.00071	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.000/7	0.0003
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.012	0.0016	ND (0.00025)	0.0039	0.00082	0.0019
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	0.0014	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	0.0024	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.00024
TRANS-1,2-DICHLOROETHYLENE mg/L	0.43	ND (0.0001)	ND (0.0001)	0.0018	ND (0.0001)	0.045
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	0.00067	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	0.00014	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.00078	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00009
CARBON TETRACHLORIDE mg/L	0.00075	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.05	ND (0.00012)	0.00022	0.0011	0.00039	0.0085
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	0.00015	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LC13-30 ~~LC16 SURF~~ kg	LC1-20 ~~LC-1 SURF~~ kg	LC-2 50	IA 100	LC-5 50	LC6-28 ~~LC-6 SURF~~ kg
Collected	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85
ERG Sample Number	06/131957	06/131958	06/131959	06/131960	06/131961	06/131962
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00043	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)

 See last page for explanation of symbols

Project: A3107.4

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 31 JUL 1985

Client ID	LC13-30 ~~LC16 SURF~~	LC1-20 ~~LC-1 SURF~~	LC-2 50	1A-100 ~~IA 100~~	LC-5 50	LC6-28 ~~LC-6 SURF~~
Collected	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85
ERG Sample Number	06/131957	06/131958	06/131959	06/131960	06/131961	06/131962
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.019	0.037	0.016	ND (0.00025)	0.012	0.025
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	0.0013	0.0073
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.0001	0.00064
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0004	0.017	0.062
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	0.0014	0.0017
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0004
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	0.00004	ND (0.00003)	ND (0.00003)	0.0034	0.0015
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00095	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.1	0.19
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0002	0.0031

Client ID	LC4-20 ~~LC-4 SURF~~	LC-1 50	3B 15	LC-4 50	LC-6 50	LC-16 50
Collected	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85
ERG Sample Number	06/131963	06/131964	06/131965	06/131966	06/131967	06/131968
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.00047	ND (0.0002)	ND (0.0002)	0.00074	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)

 See last page for explanation of symbols

Project: A3107.4

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 31 JUL 1985

Client ID	LC4-20 ~~LC-4 SURF~~ fg	LC-1 50	3B 15	LC-4 50	LC-6 50	LC13-50 ~~LC-16 50~~ fg
Collected	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85	06-17-85
ERG Sample Number	06/131963	06/131964	06/131965	06/131966	06/131967	06/131968
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.014	0.00043	0.00092	0.0008	0.0006	0.00064
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	0.00015	ND (0.00013)	ND (0.00013)	ND (0.00013)	0.0044	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.00031	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.0017	ND (0.0001)	0.0086	0.0011	0.039	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	0.00092	0.0017
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00003	0.00024	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.00005	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0011	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.00017
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.011	0.00033	0.0027	0.011	0.14	0.002
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	*
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	*
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	*
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	0.00005	0.00005	0.00004	ND (0.00003)	0.0021	ND (0.00003)

Client ID	LC-3 50	LC16-16 ~~LC-13 SURF~~ fg	LC16-50 ~~LC-12 50~~ fg
Collected	06-17-85	06-17-85	06-17-85
ERG Sample Number	06/131969	06/131970	06/131971
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter			
PURGEABLE AROMATICS			
BENZENE mg/L	0.00022	ND (0.0002)	0.0014
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601			
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)

 See last page for explanation of symbols

Project: A3107.4

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 31 JUL 1985

Client ID	LC-3 50	LC16-16 ~~LC-13 SURF~~	LC-16-50 ~~LC-13 50~~
Collected	06-17-85	06-17-85	06-17-85
ERG Sample Number	06/131969	06/131970	06/131971
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter			
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	0.005	0.0018
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	<0.00013	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.0026	0.0027
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0018	0.014	0.016
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.00003	0.00003

Project Comments:

Comments about sample 06/131968
PURGEABLES, 601 - *UNRESOLVED AT 0.19 ug/L.

Note Results indicated by '*' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

Project: A3107.404

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: CONTRACT
Report #: 215
Samples Rec'd: 08-14-85
SAMPLE DATES: 06-17/18/19-85

Approved: Thomas Cullen
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	AZ07-58	DZ12-13	AZ09-28	AZ08-38	DZ09-53	DZ09-13
ERG Sample Number	132945 08/134879	131946 08/134880	132947 08/134881	131948 08/134882	131950 08/134883	131951 08/134884
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	0.00009	ND (0.0002)	ND (0.0002)	0.00023
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.005	0.011	ND (0.00025)	ND (0.00025)	ND (0.00025)	0.016
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.27	0.19
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.0015	0.097	0.06
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols

CONTINUED

Client ID	AZ09-58	DZ13-25	LC13-30	LC5-50	LC6-28	LC4-20
ERG Sample Number	131954	131956	131957	131961	131962	131963
Matrix	08/134885	08/134886	08/134887	08/134888	08/134889	08/134890
Parameter	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.0041	0.028	0.01	0.029	0.034	0.018
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.023	ND (0.0001)	0.013	0.028	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0018	0.01	0.001	0.13	0.16	0.012
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	W3B-15	LC4-50	LC6-50	LC13-50	LC3-50	LC16-16
ERG Sample Number	131965	131966	131967	131968	131969	131970
Matrix	08/134891	08/134892	08/134893	08/134894	08/134895	08/134896
Parameter	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.00089	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)

 See last page for explanation of symbols

Client ID	W3B-15	LC4-50	LC6-50	LC13-50	LC3-50	LC16-16
ERG Sample Number	131965 08/134891	131966 08/134892	131967 08/134893	131968 08/134894	131969 08/134895	131970 08/134896
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	0.032	ND (0.00025)	ND (0.00025)	0.0065
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0036	0.018	0.28	0.0013	0.0017	0.013
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LC16-50	DZ10-13	LC1-20	LC2-50
ERG Sample Number	131971 08/134897	131955 08/134906	131958 08/134907	131959 08/134908
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter				
PURGEABLE AROMATICS				
BENZENE mg/L	ND (0.0002)	0.0005	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601				
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID ERG Sample Number Matrix Parameter	LC16-50 131971 08/134897 NATURAL WATER	DZ10-13 131955 08/134906 NATURAL WATER	LC1-20 131958 08/134907 NATURAL WATER	LC2-50 131959 08/134908 NATURAL WATER
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	0.038	0.027
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS 1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0097	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
– = Test not requested for this sample

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.5

Report Date: 08/05/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD M. GREILING

Client P.O.: 16-860015-90
Report #: 188
Samples Rec'd: 06-26-85
SAMPLE DATES: 06-24/25-85

Approved:
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID / Collected / ERG Sample Number / Matrix / Parameter	TZ06 06-19-85 06/132097 NATURAL WATER	TZ07 06-19-85 06/132098 NATURAL WATER	TZ03 06-19-85 06/132099 NATURAL WATER	TZ06-QC ~~0202~~ 06-19-85 06/132100 NATURAL WATER	TZ05 06-19-85 06/132101 NATURAL WATER	TZ04 06-19-85 06/132102 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0016	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	0.0049	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.00034	0.00043
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	0.00023	0.0056	0.0023	0.008	0.012
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.0033	0.0062
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0 0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Page 1 See last page for explanation of symbols

CONTINUED

Project A3107 5

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 05 AUG 1985

Client ID	~~DZ03~~ DZ14-QC	~~DZ01~~ TZ03-QC	DZ14	TZ01	TZ02	AZ09 28
Collected	06-19-85	06-19-85	06-19-85	06-19-85	06-19-85	06-24-85
ERG Sample Number	06/132103	06/132104	06/132105	06/132106	06/132107	06/132339
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0019	ND (0.0002)	ND (0.0002)	0.001	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.0062	0.0041	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.014	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLORCETHANE, 1,1,1- mg/L	0.015	0.0019	0.00047	0.0018	0.0032	0.0014
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.0011
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00004

Client ID	AZ09 58	DZ09 13	DZ09 53	~~DZ01 13~~ DZ10-13-QC	DZ10 13	DZ10 63
Collected	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85
ERG Sample Number	06/132340	06/132341	06/132342	06/132343	06/132344	06/132345
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)

 See last page for explanation of symbols

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ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	AZ09 58	DZ09 13	DZ09 53	DZ10-13-QC ~~DZ01 13~~	DZ10 13	DZ10 63
Collected	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85
ERG Sample Number	06/132340	06/132341	06/132342	06/132343	06/132344	06/132345
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	0.0067	ND (0.00025)	0.0014	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	0.00017	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.11	0.23	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.002	0.003	0.0033	0.0016	0.00048	0.0007
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0011	0.025	0.07	0.00093	0.00095	0.0012
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	0.00004	ND (0.00003)	ND (0.00003)	0.00008	0.00007	0.00011

Client ID	DZ11 33	AZ07 58	AZ08 38	DZ13-25-QC ~~DZ02 25~~	DZ13 25	DZ12 73
Collected	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85
ERG Sample Number	06/132346	06/132347	06/132348	06/132349	06/132350	06/132351
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.00053	ND (0.0002)	ND (0.0002)	0.00026	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)

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ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	DZ11 33	AZ07 58	AZ08 38	~~DZ02 25~~ DZ13-25-QC	DZ13 25	DZ12 73
Collected	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85
ERG Sample Number	06/132346	06/132347	06/132348	06/132349	06/132350	06/132351
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.0002	0.00019	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.023	0.021	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	0.00008	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00019	0.00044	0.00044
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.00091	0.0017	0.01	0.0089	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.00007	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	DZ14 63	TZ06 60	TZ04 28	TZ03 58	TZ01 65	DR01 PUMP
Collected	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85
ERG Sample Number	06/132352	06/132353	06/132354	06/132524	06/132525	06/132526
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0004	0.00063	ND (0.0002)	0.00023	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.5

Report Date: 05 AUG 1985

Client ID Collected ERG Sample Number Matrix Parameter	DZ14 63 06-24-85 06/132352 NATURAL WATER	TZ06 60 06-24-85 06/132353 NATURAL WATER	TZ04 28 06-24-85 06/132354 NATURAL WATER	TZ03 58 06-24-85 06/132524 NATURAL WATER	TZ01 65 06-24-85 06/132525 NATURAL WATER	DR01 PUMP 06-24-85 06/132526 NATURAL WATER
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.00023
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.0004	ND (0.0001)	ND (0.0001)	0.026
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00007
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.006	ND (0.00012)	ND (0.00012)	0.0095
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID Collected ERG Sample Number Matrix Parameter	DR05-PUMP 06-24-85 06/132527 NATURAL WATER	TZ05-38 ~~DZ08-38~~ fg 06-24-85 06/132528 NATURAL WATER	TZ07-43-QC ~~DZ10~~ fg 06-24-85 06/132529 NATURAL WATER	DR02-PUMP ~~DZ02-PUMP~~ fg 06-24-85 06/132530 NATURAL WATER	TZ02 57 06-24-85 06/132531 NATURAL WATER	TZ07 43 06-24-85 06/132532 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	0.00048	ND (0.0002)	0.0004	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.0006
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	DR05-PUMP	TZ05-38 ~~DZ05-38~~	TZ07-43 QC ~~GZ10-~~	DR02-PUMP ~~DZ02-PUMP~~	TZ02 57	TZ07 43
Collected	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85	06-24-85
ERG Sample Number	06/132527	06/132528	06/132529	06/132530	06/132531	06/132532
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
DICHLOROETHANE, 1,1- mg/L	0.00023	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.0068	0.00035	ND (0.0001)	ND (0.0001)	0.017	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	0.00053	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0064	0.0033	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Project Comments:

Comments about sample 06/132350
PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS
PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS

Note Results indicated by '*' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107 505

Report Date: 08/09/85
SECOND COLUMN CONFIRMATION

Results by Sample

Prepared for:
SAIC-FIG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: CONTRACT
Report #: 197
Samples Rec'd: 08-07-85

Approved: Thomas Cullen Jr.
Refer Questions to:
THOMAS CULLEN JR.

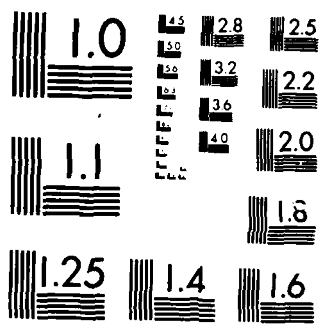
**
Residual Samples Will Be Held
For Two Weeks
**

Client ID / ERG Sample Number / Matrix / Parameter	TZ07 / 132098 / 08/134408 / NATURAL WATER	TZ03 / 132099 / 08/134409 / NATURAL WATER	TZ05 / 132101 / 08/134410 / NATURAL WATER	TZ04 / 132102 / 08/134411 / NATURAL WATER	DZ14-QC / 132103 / 08/134412 / NATURAL WATER	TZ03-QC / 132104 / 08/134413 / NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	0.0019	-	-	-	-	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	-	-	-	-	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	-	-	-	-	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	-	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	-	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	-	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	-	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	-	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	-	0.0065	ND (0.00025)	ND (0.00025)	0.0046	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	-	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	-	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	-	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	-	ND (0.0001)	0.00043	0.00026	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	-	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLOROETHANE, 1,2- mg/L	-	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	-	*	*	*	*	*
CARBON TETRACHLORIDE mg/L	-	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	-	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	-	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	-	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	-	*	*	*	*	*
DIBROMOCHLOROMETHANE mg/L	-	ND (0.00009)	ND (0.00007)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	-	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	-	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	-	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	-	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	-	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	-	ND (0.00003)	0.00045	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols CONTINUED

AD-A164 835 INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION S..(U) SCIENCE APPLICATIONS INTERNATIONAL CORP BELLEVE WA R W GREILLING ET AL. 20 DEC 85 SAIC-85/1791 F33615-80-D-4002 5/7

UNCLASSIFIED F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 09 AUG 1985
SECOND COLUMN CONFIRMATION

Client ID	TZ02	AZ09-28	AZ09-58	DZ09-13	DZ09-53	DZ10-63
ERG Sample Number	132107	132339	132340	132341	132342	132345
	08/134414	08/134415	08/134416	08/134417	08/134418	08/134419
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.0014	-	-	-	-	-
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	-	-	-	-	-
TOLUENE mg/L	ND (0.0002)	-	-	-	-	-
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	0.01	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.01	ND (0.0001)	ND (0.0001)	0.084	0.16	0.00019
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLOROETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	*	*	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	*	*	0.044	0.11	0.00072
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	AZ08-38	DZ13-25-QC	DZ13-25	TZ04-28	DR01-PUMP	TZ05-38
ERG Sample Number	132348	132349	132350	132354	132526	132528
	08/134420	08/134421	08/134422	08/134423	08/134424	08/134425
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	-	-	-	-	-	-
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	-	-	-	-	-	-

 See last page for explanation of symbols

erg ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project A3107 505

Report Date 09 AUG 1985
SECOND COLUMN CONFIRMATION

Client ID	AZ08-38	DZ13-25-QC	DZ13-25	TZ04-28	DR01-PUMP	TZ05-38
ERG Sample Number	132348	132349	132350	132354	132526	132528
	08/134420	08/134421	08/134422	08/134423	08/134424	08/134425
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
TOLUENE mg/L	-	-	-	-	-	-
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.015	0.01	0.00029	0.02	0.00026
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0013	0.013	0.0092	0.0065	0.017	0.0045
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	TZ02-57	DR05-PUMP
ERG Sample Number	132531	132527
	08/134426	08/134427
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	-	-
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	-	-
TOLUENE mg/L	-	-
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project A3107 505

Report Date 09 AUG 1985
SECOND COLUMN CONFIRMATION

Client ID	TZ02-57	DR05-PUMP
ERG Sample Number	132531 08/134426	132527 08/134427
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.011	0.0051
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.0086
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)

Project Comments:

Comments about sample 08/134409
PURGEABLES, 601 - *UNRESOLVED AT 0.53 ug/L
Comments about sample 08/134410
PURGEABLES, 601 *UNRESOLVED AT 9.6 ug/L
Comments about sample 08/134411
PURGEABLES, 601 - *UNRESOLVED AT 17 ug/L
Comments about sample 08/134412
PURGEABLES, 601 - *UNRESOLVED AT 6.5 ug/L
Comments about sample 08/134413
PURGEABLES, 601 *UNRESOLVED AT 0.15 ug/L
Comments about sample 08/134415
PURGEABLES, 601 - *UNRESOLVED AT 1.5 ug/L
Comments about sample 08/134416
PURGEABLES, 601 *UNRESOLVED AT 1.6 ug/L

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107 6

Report Date: 08/05/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD W. GREILING

Client P.O.: 16-860015-90
Report #: 189
Samples Rec'd: 07-03-85
SAMPLE DATE: 07-01-85

Approved: [signature]
Refer Questions to:
CAROLYN NOACK

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	DZ14	LZ04	TZ04	LZ01	TZ03	TZ02
Collected	07-01-85	07-01-85	07-01-85	07-01-85	07-01-85	07-01-85
ERG Sample Number	07/132712	07/132713	07/132714	07/132715	07/132716	07/132717
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0007	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.00019
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.00029	ND (0.0001)	ND (0.0001)	0.015
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00034
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.0063	0.00078	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Page 1 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107 6

Report Date: 05 AUG 1785

Client ID	LZ03	TZ01	TZ04-QC ~~0Z01~~	TZ07	LZ02	TZ06
Collected	07-01-85	07-01-85	07-01-85	07-01-85	07-01-85	07-01-85
ERG Sample Number	07/132718	07/132719	07/132720	07/132721	07/132722	07/132723
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.0013	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.00044	ND (0.0001)	0.0021	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.0071	ND (0.00012)	0.021	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00012	ND (0.00003)

Client ID	TZ05	FIELD BLANK
Collected	07-01-85	07-01-85
ERG Sample Number	07/132724	07/132725
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.6

Report Date: 05 AUG 1985

Client ID	T205	FIELD BLANK
Collected	07-01-85	07-01-85
ERG Sample Number	07/132724	07/132725
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.00036	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0042	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)

Project Comments:

JRB - AMERICAN LAKE GARDEN TRACT
Comments about sample 07/132722
PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS
PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS

Note Results indicated by '@' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

117 N. FIRST
ANN ARBOR, MICHIGAN 48104 (313) 662-3104

Project: A3107.606
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

Client P.O: CONTRACT
Report: 14258

Client:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Samples Recvd: 08-07-85
Refer Questions To:
THOMAS CULLEN JR

Approved: Thomas J. Cullen Jr.

***
Residual Samples Will Be Held
TWO WEEKS
***

WELL ID: TZ04
Client I.D.: 132714
ERG Sample No.: 08/134433
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L
TRANS-1,2-DICHLOROETHYLENE	0.28	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	8.1	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLORDETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	ND (0.03)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

See last page for explanation of symbols.

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.606
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

TZ02
Client I.D.: 132717
ERG Sample No.: 08/134434
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L
TRANS-1,2-DICHLOROETHYLENE	13	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	ND (0.12)	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	ND (0.03)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

TZ04-QC
Client I.D.: 132720
ERG Sample No.: 08/134435
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L

 See last page for explanation of symbols.

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.606
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

WELL ID: TZ04-QC
Client I.D.: 132720
ERG Sample No.: 08/134435
Matrix: NATURAL WATER

Parameter	Result	Units
TRANS-1,2-DICHLOROETHYLENE	0.27	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLOROETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	5.4	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	ND (0.03)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

WELL ID: TZ05
Client I.D.: 132724
ERG Sample No.: 08/134436
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L
TRANS-1,2-DICHLOROETHYLENE	0.32	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLOROETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	4.5	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L

 See last page for explanation of symbols.

ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.606
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

WELL ID: TZ05
Client I.D.: 132724
ERG Sample No.: 08/134436
Matrix: NATURAL WATER

Parameter	Result	Units
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	ND (0.03)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

WELL ID: LZ02
Client I.D.: 132722
ERG Sample No.: 08/134437
Matrix: NATURAL WATER

Parameter	Result	Units
PURGEABLE AROMATICS		
BENZENE	ND (0.20)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L
ETHYLBENZENE	ND (0.20)	ug/L
TOLUENE	ND (0.20)	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
PURGEABLES, 601		
CHLOROMETHANE	ND (0.08)	ug/L
BROMOMETHANE	ND (1.2)	ug/L
DICHLORODIFLUOROMETHANE	ND (1.8)	ug/L
VINYL CHLORIDE	ND (0.18)	ug/L
CHLOROETHANE	ND (0.52)	ug/L
METHYLENE CHLORIDE	ND (0.25)	ug/L
TRICHLOROFLUOROMETHANE	ND (0.50)	ug/L
DICHLOROETHYLENE, 1,1-	ND (0.13)	ug/L
DICHLOROETHANE, 1,1-	ND (0.07)	ug/L
TRANS-1,2-DICHLOROETHYLENE	1.5	ug/L
CHLOROFORM	ND (0.05)	ug/L
DICHLORETHANE, 1,2-	ND (0.03)	ug/L
TRICHLOROETHANE, 1,1,1-	ND (0.03)	ug/L
CARBON TETRACHLORIDE	ND (0.12)	ug/L
BROMODICHLOROMETHANE	ND (0.10)	ug/L
DICHLOROPROPANE, 1,2-	ND (0.04)	ug/L
TRANS-1,3-DICHLOROPROPENE	ND (0.34)	ug/L
TRICHLOROETHYLENE	25	ug/L
DIBROMOCHLOROMETHANE	ND (0.09)	ug/L
TRICHLOROETHANE, 1,1,2-	ND (0.02)	ug/L
CIS-1,3-DICHLOROPROPENE	ND (0.20)	ug/L

 See last page for explanation of symbols.

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.606
Report Date: 08-09-85
SECOND COLUMN CONFIRMATION

WELL ID: LZ02
Client I.D.: 132722
ERG Sample No.: 08/134437
Matrix: NATURAL WATER

Parameter	Result	Units
CHLOROETHYLVINYL ETHER, 2-	ND (0.13)	ug/L
BROMOFORM	ND (0.20)	ug/L
TETRACHLOROETHANE, 1,1,2,2-	ND (0.03)	ug/L
TETRACHLOROETHYLENE	0.07	ug/L
CHLOROBENZENE	ND (0.25)	ug/L
DICHLOROBENZENE, 1,3-	ND (0.32)	ug/L
DICHLOROBENZENE, 1,2-	ND (0.15)	ug/L
DICHLOROBENZENE, 1,4-	ND (0.24)	ug/L

SD-Sample damaged
FR-See field report for result
SR-See attached report
NA-Result not applicable to test

ND-Nondetected, Detection limit in ()
<-Positive result at an unquantifiable concentration below indicated level

Thank you for your business.

erg
ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC
117 N FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.7

Report Date: 08/12/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860015-90
Report #: 201
Samples Rec'd: 07-12-85
SAMPLE DATE: 07-09-85

Approved: [signature]
Refer Questions to:
THOMAS CULLEN
**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	EPA 1C-40	EPA 8B-32	FIELD BLANK ~~DR10-65~~	EPA 6B-38	DZ13-25	DZ11-33
ERG Sample Number	07/133171	07/133172	07/133173	07/133174	07/133175	07/133176
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.00075	<0.0002	ND (0.0002)	ND (0.0002)	0.0017	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	0.00039	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.00026	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.036	0.00047	ND (0.0001)	ND (0.0001)	0.028	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.00017	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00018	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (C 00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.013	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.012	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Page 1 See last page for explanation of symbols CONTINUED

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.7

Report Date: 12 AUG 1985

Client ID	EPA 4A-117	AZ08-38	AZ08-38 (QC) ~~AZ10-18~~ Rg	DZ08-22	EPA 3A-43	EPA 6A-52
ERG Sample Number	07/133177	07/133178	07/133179	07/133180	07/133181	07/133182
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	0.0004	ND (0.0002)	ND (0.0002)	0.0013
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.002	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.0012	0.00086	0.00046	0.00026	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	EPA 7A-60	EPA 7B-32	EPA 4A-117 (QC) ~~EPA 10B-30~~ Rg	EPA 8A-46	DZ09-13	DZ09-53
ERG Sample Number	07/133183	07/133184	07/133185	07/133186	07/133187	07/133188
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00041	0.0008	0.0003
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)

 See last page for explanation of symbols

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ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.7

Report Date: 12 AUG 1985

Client ID ERG Sample Number Matrix Parameter	EPA 7A-60 07/133183 NATURAL WATER	EPA 7B-32 07/133184 NATURAL WATER	EPA 4A-117 (QC) ~~EPA 10B-80~~ 07/133185 NATURAL WATER	EPA 8A-46 07/133186 NATURAL WATER	DZ09-13 07/133187 NATURAL WATER	DZ09-53 07/133188 NATURAL WATER
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	0.00082	0.0013
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.14	0.23
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0005	0.0011
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.0012	0.032	0.069
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID ERG Sample Number Matrix Parameter	DZ12-73 07/133189 NATURAL WATER	DZ10-63 07/133190 NATURAL WATER	DZ10-13 07/133191 NATURAL WATER	DZ14-63 07/133192 NATURAL WATER
PURGEABLE AROMATICS				
BENZENE mg/L	0.00052	ND (0.0002)	0.00039	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601				
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)

Page 3 See last page for explanation of symbols

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.7

Report Date: 12 AUG 1985

Client ID ERG Sample Number Matrix Parameter	DZ12-73 07/133189 NATURAL WATER	DZ10-63 07/133190 NATURAL WATER	DZ10-13 07/133191 NATURAL WATER	DZ14-63 07/133192 NATURAL WATER
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	0.00017	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOPOETHYLENE mg/L	ND (0.00012)	0.00018	0.00082	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Project Comments:

Comments about sample 07/133192
PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS
PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS

Note Results indicated by '@' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
-- = Test not requested for this sample

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.707

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-EIG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: CONTRACT
Report #: 213
Samples Rec'd: 08-14-85

Approved: Thomas Cullen
Refer Questions to:
THOMAS CULLEN JR.

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	W1C-40	DZ13-25	AZ08-38	W6A-52	W8A-46	DZ09-13
ERG Sample Number	133171 08/134438	133175 08/134439	133178 08/134440	133182 08/134441	133186 08/134931	133187 08/134932
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.0002	0.002	-	0.00085	-	0.0011
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	-	ND (0.0002)	-	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	-	ND (0.0002)	-	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	-	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	-	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	-	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	-	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	-	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	-	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	-	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	-	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	-	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.018	0.016	ND (0.0001)	-	ND (0.0001)	0.076
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	-	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	-	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	-	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	-	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	-	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	-	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	-	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.015	0.014	0.0015	-	0.00089	0.039
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	-	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	-	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	-	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	-	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	-	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	-	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	-	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	DZ09-53 133188
ERG Sample Number	08/134933
Matrix	NATURAL WATER
Parameter	
PURGEABLE AROMATICS	
BENZENE mg/L	-
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)
ETHYLBENZENE mg/L	-
TOLUENE mg/L	-
CHLOROBENZENE mg/L	ND (0.00025)
PURGEABLES, 601	
CHLOROMETHANE mg/L	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.094
CHLOROFORM mg/L	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.056
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

erg

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Report Date: 08/13/85

Results by Sample

Prepared for:
SAIC-ETQ
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860014-90
Report #: 203
Samples Rec'd: 07-19-85
SAMPLE DATES: 07-09/10-85

Approved: Thomas Cullen Jr.
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	TZ07-43	TZ09-38	TZ08-38	TZ05-38	LZ03-39	TZ04-28
ERG Sample Number	07/133193	07/133194	07/133195	07/133196	07/133197	07/133198
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	0.00054	0.0019	0.0015	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.00042	0.00043	ND (0.0001)	0.00039
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.00022	0.0044	ND (0.00012)	0.0048
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	TZ10-48	TZ03-58	TZ01-65	LZ02-23	LZ02-23 (QC) ~~LZ12-82~~	LZ01-43
ERG Sample Number	07/133199	07/133200	07/133201	07/133202	07/133203	07/133204
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0031	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00045
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0018	0.0016	0.00015
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0003	0.00018	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.[illegible]034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND ([illegible].00012)	ND (0.00012)	0.02	0.018	<0.00012
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LZ04-58	TZ02-57	TZ06-60	TZ09-38	TZ10-48	FIELD BLANK
ERG Sample Number	07/133205	07/133213	07/133214	07/133215	07/133216	07/133217
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	LZ04-58	TZ02-57	TZ06-60	TZ09-38	TZ10-48	FIELD BLANK
ERG Sample Number	07/133205	07/133213	07/133214	07/133215	07/133216	07/133217
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.016	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.00015
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	TZ08-38	TZ02-57	TZ07-43	TZ09-43	TZ06-60	TZ10-53
Collected		07-14-85	07-14-85	07-14-85	07-14-85	07-14-85
ERG Sample Number	07/133218	07/133369	07/133370	07/133371	07/133372	07/133373
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.0043	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)

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Client ID	TZ08-38	TZ02-57	TZ07-43	TZ09-43	TZ06-60	TZ10-53
Collected		07-14-85	07-14-85	07-14-85	07-14-85	07-14-85
ERG Sample Number	07/133218	07/133369	07/133370	07/133371	07/133372	07/133373
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	0.017	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.00018	ND (0.00012)	0.00016	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LZ01-43	LZ02-23	TZ05-38	TZ04-28	TZ03-58	TZ08-43
Collected	07-14-85	07-14-85	07-14-85	07-14-85	07-14-85	07-14-85
ERG Sample Number	07/133374	07/133375	07/133376	07/133377	07/133378	07/133379
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	0.001	ND (0.0002)	0.00037	0.0013
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)

See last page for explanation of symbols

Client ID	LZ01-43	LZ02-23	TZ05-38	TZ04-28	TZ03-58	TZ08-43
Collected	07-14-85	07-14-85	07-14-85	07-14-85	07-14-85	07-14-85
ERG Sample Number	07/133374	07/133375	07/133376	07/133377	07/133378	07/133379
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.00021	0.0018	0.00031	0.00039	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	0.00014	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.02	0.0035	0.005	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LZ03-39	LZ04-63	LZ01-43 (QC) ~~LZ01-100~~ rg	LZ04-63 (QC) ~~LZ04-100~~ rg	TZ01-65	LZ01-43
Collected	07-14-85	07-14-85	07-14-85	07-14-85	07-14-85	07-16-85
ERG Sample Number	07/133380	07/133381	07/133382	07/133383	07/133417	07/133485
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.00027	0.00027	ND (0.0002)	0.00088	0.00046
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	0.00017	ND (0.0001)	ND (0.0001)	0.00016

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.8

Report Date: 13 AUG 1985

Client ID	LZ03-39	LZ04-63	LZ01-43 (QC) ~~LZ01-100~~ fg	LZ04-63 (QC) ~~LZ04-100~~ fg	TZ01-65	LZ01-43
Collected	07-14-85	07-14-85	07-14-85	07-14-85	07-14-85	07-16-85
ERG Sample Number	07/133380	07/133381	07/133382	07/133383	07/133417	07/133485
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LZ02-23	LZ03-39	LZ04-58	TZ08-38	TZ09-38	TZ10-48
Collected	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85
ERG Sample Number	07/133486	07/133487	07/133488	07/133489	07/133490	07/133491
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.0013	0.0012	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	NL (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.0021	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)

 See last page for explanation of symbols

Client ID	LZ02-23	LZ03-39	LZ04-58	TZ08-38	TZ09-38	TZ10-48
Collected	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85
ERG Sample Number	07/133486	07/133487	07/133488	07/133489	07/133490	07/133491
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.023	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	TZ11-32	TZ12-53	TZ08-38 (QC) ~~TZ17-40~~	TZ10-48 (QC) ~~TZ18-85~~	TZ08-38	TZ09-38
Collected	07-16-85	07-16-85	07-16-85	07-16-85	07-18-85	07-18-85
ERG Sample Number	07/133492	07/133493	07/133494	07/133495	07/133538	07/133539
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	<0.0001	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	0.00011	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.0017	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)

See last page for explanation of symbols

erg ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC

Project: A3107.B

Report Date: 13 AUG 1985

Client ID	TZ11-32	TZ12-53	~~TZ17-40~~ TZ08-38 (QC)	~~TZ10-35~~ TZ10-48 (QC)	TZ08-38	TZ09-38
Collected	07-16-85	07-16-85	07-16-85	07-16-85	07-18-85	07-18-85
ERG Sample Number	07/133492	07/133493	07/133494	07/133495	07/133538	07/133539
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	TZ10-48	TZ11-32	TZ12-53	~~TZ10-48~~ TZ12-53 (QC)	LZ01-43	LZ02-23
Collected	07-18-85	07-18-85	07-18-85	07-18-85	07-18-85	07-18-85
ERG Sample Number	07/133540	07/133541	07/133542	07/133543	07/133544	07/133545
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0014
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	0.00099	0.0013	ND (0.00012)	0.015
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)

 See last page for explanation of symbols

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	TZ10-48	TZ11-32	TZ12-53	TZ12-53 (QC) ~~TZ18-48~~ Rg	LZ01-43	LZ02-23
Collected	07-18-85	07-18-85	07-18-85	07-18-85	07-18-85	07-18-85
ERG Sample Number	07/133540	07/133541	07/133542	07/133543	07/133544	07/133545
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LZ03-39	FIELD BLANK ~~LZ07-35~~ Rg	LZ04-58
Collected	07-18-85	07-18-85	07-18-85
ERG Sample Number	07/133546	07/133547	07/133548
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter			
PURGEABLE AROMATICS			
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601			
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.8

Report Date: 13 AUG 1985

Client ID	LZ03-39	FIELD BLANK ~~LZ07-35~~	LZ04-58
Collected	07-18-85	07-18-85	07-18-85
ERG Sample Number	07/133546	07/133547	07/133548
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter			
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)

Project Comments:

Comments about sample 07/133216
- PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS
- PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS

Comments about sample 07/133383
- PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS
- PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS

Comments about sample 07/133495
- PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS
- PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS

Note Results indicated by '@' are in mg/Kg instead of mg/L
- FR = See field report for result
- NA = Not applicable to test requested
- ND = Nondetected, detection limit in ()
- SD = Sample damaged
- SR = See attached report for result
- < = Positive result but at unquantifiable concentration below inicated level
- \- = Test not requested for this sample

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Project: A3107.808

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: CONTRACT
Report #: 208
Samples Rec'd: 08-13-85
SAMPLE DATES: 07-09/10-85

Approved: Thomas Cullen
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	TZ05-38	LZ03-39	TZ04-28	TZ03-58	TZ02-57	LZ02-23 (QC)
ERG Sample Number	133196	133197	133198	133200	133213	133203
Matrix	08/134806 NATURAL WATER	08/134807 NATURAL WATER	08/134808 NATURAL WATER	08/134809 NATURAL WATER	08/134810 NATURAL WATER	08/134811 NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	0.0022	0.0023	ND (0.0002)	0.0047	0.00073	0.00051
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.00017	ND (0.0001)	0.00024	ND (0.0001)	0.0076	0.0011
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0051	ND (0.00012)	0.0067	ND (0.00012)	0.00094	0.019
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols

CONTINUED

Client ID	LZ02-23	TZ02-57	LZ02-23	TZ05-38	TZ04-28	TZ08-43
ERG Sample Number	133202 08/134812	133369 08/134813	133375 08/134814	133376 08/134815	133377 08/134816	133379 08/134817
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.00085	0.002	0.00045	ND (0.0002)	0.0001
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.00088	0.016	0.0012	0.00018	0.00019	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.016	ND (0.00012)	0.026	0.0058	0.0067	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	LZ02-32	TZ12-53	TZ12-53 (QC)	LZ02-23
ERG Sample Number	133486 08/134818	133493 08/134819	133543 08/134820	133545 08/134821
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter				
PURGEABLE AROMATICS				
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	LZ02-32	TZ12-53	TZ12-53 (QC)	LZ02-23
ERG Sample Number	133486	133493	133543	133545
Matrix	08/134818	08/134819	08/134820	08/134821
Parameter	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601				
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.001	ND (0.0001)	ND (0.0001)	0.00099
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.021	0.0012	0.00098	0.022
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Note   Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.
117 North First Street
Ann Arbor, MI 48104

Project: A3107.808
Report Date: 09-13-85

SAIC
ATTN: R. Greiling

Approved: [signature]

Residual Samples Will Be Held
Two Weeks

Sample ID: Run #193
ERG Sample No.: 133417
Matrix: Ground Water

Parameter	Result	Units
Benzene (Confirmation Run)	ND (0.2)	ug/l

Sample ID: Run #194
ERG Sample No.: 133487
Matrix: Ground Water

Parameter	Result	Units
Benzene (Confirmation Run)	ND (0.2)	ug/l

ND - Not Detected, Detection limit in ()

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.9

Report Date: 08/12/85

Results by Sample

Prepared for:
SAIC-ETO
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860015-90
Report #: 202
Samples Rec'd: 07-16-85
SAMPLE DATE: 07-12-85

Approved: Thomas G. Cullen Jr.
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID ERG Sample Number Matrix Parameter	DR01-P 07/133219 NATURAL WATER	DR02-P 07/133220 NATURAL WATER	DR05-25 07/133221 NATURAL WATER	DR02-PQC ~~DR25-18~~ 07/133222 NATURAL WATER	EPA-1A-100 07/133223 NATURAL WATER	EPA-5-43 07/133224 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	0.00022	ND (0.0002)	0.0014	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	0.00023	ND (0.00007)	0.00017	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.049	ND (0.0001)	0.011	0.00058	0.00021	0.0063
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.00021	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	0.0011	ND (0.0001)	0.00023	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.017	ND (0.00012)	0.0089	ND (0.00012)	ND (0.00012)	0.00039
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	0.00008	ND (0.00003)	0.00008	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols CONTINUED

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.9

Report Date: 12 AUG 1985

Client ID ERG Sample Number Matrix Parameter	AZ07-58 07/133225 NATURAL WATER	AZ09-28 07/133226 NATURAL WATER	AZ09-58 07/133227 NATURAL WATER	EPA2B-19 07/133228 NATURAL WATER	EPA4B-74 07/133229 NATURAL WATER	EPA4C-35 07/133230 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	0.00036	ND (0.0002)	0.0004	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	0.0005	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00042
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	0.00043	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0054	0.031
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.0001
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.0000.)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00084	ND (0.00012)	0.0014	ND (0.00012)	0.00067	0.0044
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	0.00007	0.00076	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID ERG Sample Number Matrix Parameter	EPA1B-78QC ~~BZ10-28~~ ky 07/133231 NATURAL WATER	LC16-16 ~~LC16-0-8~~ ky 07/133232 NATURAL WATER	LC16-50 07/133233 NATURAL WATER	EPA3B-15 07/133234 NATURAL WATER	EPA2A-38 07/133235 NATURAL WATER	EPA1B-78 07/133236 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	0.00047	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)

 See last page for explanation of symbols

Project: A3107.9

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Report Date: 12 AUG 1985

Client ID	EPA1B-78QC ~~DZ10-28~~	LC16-16 ~~LC16-8-8~~	LC16-50	EPA3B-15	EPA2A-3B	EPA1B-7B
ERG Sample Number	07/133231	07/133232	07/133233	07/133234	07/133235	07/133236
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00009)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.019	0.0012	ND (0.0001)	0.0055	ND (0.0001)	0.023
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00005	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00005
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00068	0.017	0.017	0.0032	ND (0.00012)	0.00087
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	DZ14-63	DZ08-22
ERG Sample Number	07/133367	07/133368
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.9

Report Date: 12 AUG 1985

Client ID ERG Sample Number Matrix Parameter	DZ14-63 07/133367 NATURAL WATER	DZ08-22 07/133368 NATURAL WATER
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	0.00034
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.00073
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.00005

Note Results indicated by '@' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.909

Report Date: 08/13/85

Results by Sample

Prepared for:
SAIC-ETO
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O: CONTRACT
Report #: 205
Samples Rec'd: 08-13-85
SAMPLE DATES: 07-12-85

Approved:
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	DR01-P	DR05-25	EPA5-43	AZ09-58	EPA4B-74	EPA4C-35
ERG Sample Number	133219 08/134822	133221 08/134823	133224 08/134824	133227 08/134825	133229 08/134826	133230 08/134827
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00003)	ND (0.00003)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.045	ND (0.0001)	0.0072	ND (0.0001)	0.0047	0.033
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.016	0.0087	ND (0.00012)	0.0013	ND (0.00012)	0.0055
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.909

Report Date: 13 AUG 1985

Client ID	EPA1B-78 (QC)	LC16-16	LC16-50	EPA3B-15	EPA1B-78
ERG Sample Number	133231	133232	133233	133234	133236
Matrix	08/134828	08/134829	08/134830	08/134831	08/134832
Parameter	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
PURGEABLE AROMATICS					
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00003)	ND (0.00003)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00003)	ND (0.00003)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00003)	ND (0.00003)
PURGEABLES, 601					
CHLOROMETHANE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.00003)	ND (0.00003)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.00003)	ND (0.00003)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00003)	ND (0.00003)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00003)	ND (0.00003)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00003)	ND (0.00003)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.00003)	ND (0.00003)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00003)	ND (0.00003)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00003)	ND (0.00003)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.021	ND (0.0001)	ND (0.0001)	ND (0.00003)	0.023
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00003)	ND (0.00003)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00003)	ND (0.00003)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.00003)	ND (0.00003)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00003)	ND (0.00003)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00003)	ND (0.00003)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.005	0.0099	0.0038	ND (0.00003)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00003)	ND (0.00003)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.00003)	ND (0.00003)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00003)	ND (0.00003)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

Page 2   LAST PAGE

erg.

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.10

Report Date: 08/13/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860015-90
Report #: 204
Samples Rec'd: 07-18-85
SAMPLE DATE: 07-16-85

Approved: Thomas Cullen Jr.
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	LC01-20 ~~LC01-0~~	LC01-50	LC02-50	LC03-50	LC04-20 ~~LC04-0~~	LC04-50
Collected	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85
ERG Sample Number	07/133430	07/133431	07/133432	07/133433	07/133434	07/133435
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	0.00082	ND (0.00025)	0.00033	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	0.00021	ND (0.00013)	0.00014	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.00061	0.0019
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	0.0003
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00007
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.00012
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	0.0018	0.0089	0.026
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	*
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	*
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	*
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	0.00029

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC

Project: A3107.10

Report Date: 13 AUG 1985

Client ID	LC05-50	~~LC06-0~~ LC06-28	LC06-50	~~LC13-0~~ LC13-30	LC13-50	~~LC20-50~~ FIELD BLANK
Collected	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85	07-16-85
ERG Sample Number	07/133436	07/133437	07/133438	07/133439	07/133440	07/133441
Matrix	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
Parameter						
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00026	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	0.00032	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	0.0001	0.00039	0.00033	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.016	0.045	0.044	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	0.002	0.0015	0.0015	ND (0.00005)	ND (0.00005)	0.004
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	0.00041	0.00039	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	0.0048	0.0018	0.0017	0.00005	0.00006	0.00007
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.18	0.26	0.26	0.0028	0.0014	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	0.00061	0.0041	0.004	ND (0.00003)	ND (0.00003)	ND (0.00003)

Client ID	D208-22
Collected	07-16-85
ERG Sample Number	07/133442
Matrix	NATURAL WATER
Parameter	
PURGEABLE AROMATICS	
BENZENE mg/L	0.00052
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Client ID	DZ08-22
Collected	07-16-85
ERG Sample Number	07/133442
Matrix	NATURAL WATER
Parameter	
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)
TOLUENE mg/L	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)
PURGEABLES, 601	
CHLOROMETHANE mg/L	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)
METHYLENE CHLORIDE mg/L	0.00055
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)
CHLOROFORM mg/L	0.00009
DICHLORETHANE, 1,2- mg/L	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00086
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)
TETRACHLOROETHYLENE mg/L	0.00006

Project Comments:

Comments about sample 07/133435
PURGEABLES, 601 - *UNRESOLVED AT 0.11 ug/L.

Note Results indicated by '@' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.1010

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: CONTRACT
Report #: 209
Samples Rec'd: 08-14-85
SAMPLE DATE: 07/16/85

Approved: Thomas Cullen
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID / ERG Sample Number / Matrix / Parameter	LC03-50 133433 08/134898 NATURAL WATER	LC04-20 133434 08/134899 NATURAL WATER	LC04-50 133435 08/134900 NATURAL WATER	LC05-50 133436 08/134901 NATURAL WATER	LC06-28 133437 08/134902 NATURAL WATER	LC06-50 133438 08/134903 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.019	0.044	0.045
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0019	0.012	0.017	0.16	0.25	0.24
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.1010

Report Date: 14 AUG 1985

Client ID	LC13-30	LC13-50
ERG Sample Number	133439 08/134904	133440 08/134905
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ne # ug/L	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ne # ug/L	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ne # ug/L	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ne # ug/L	ND (0.00024)
ETHYLBENZENE mg/L	ne # ug/L	ND (0.0002)
TOLUENE mg/L	ne # ug/L	ND (0.0002)
CHLOROBENZENE mg/L	ne # ug/L	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.00081	0.001
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Project: A3107.11

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860014-90
Report #: 207
Samples Rec'd: 07-25-85
SAMPLE DATES: 07-22/23/24-85

Approved: Linda L. Johnson
Refer Questions to:
THOMAS CULLEN
**
Residual Samples Will Be Held
For Two Weeks
**

Client ID / Collected / ERG Sample Number / Matrix / Parameter	TZ11-32 / 07-22-85 / 07/133760 / NATURAL WATER	TZ12-53 / 07-22-85 / 07/133761 / NATURAL WATER	FIELD BLANK / 07-22-85 / 07/133762 / NATURAL WATER	TZ11-32 / 07-23-85 / 07/133763 / NATURAL WATER	TZ12-53 / 07-23-85 / 07/133764 / NATURAL WATER	TZ11-32 / 07-24-85 / 07/133765 / NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00084	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	ND (0.00012)	0.00082	0.00013	ND (0.00012)	0.00087	ND (0.00012)
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols CONTINUED

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ANALYTICAL REPORT
ENVIRONMENTAL RESEARCH GROUP, INC.

Project: A3107.11

Report Date: 14 AUG 1985

Client ID	TZ12-53
Collected	07-24-85
ERG Sample Number	07/133766
Matrix	NATURAL WATER
Parameter	
PURGEABLE AROMATICS	
BENZENE mg/L	0.00082
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)
TOLUENE mg/L	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)
PURGEABLES, 601	
CHLOROMETHANE mg/L	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0009
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)

Project Comments:

Comments about sample 07/133766
PURGEABLE AROMATICS - * AVERAGE OF DUPLICATE RUNS
PURGEABLES, 601 - * AVERAGE OF DUPLICATE RUNS

Note Results indicated by '@' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
\- = Test not requested for this sample

Project: A3107.1111

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N FIRST ST.
ANN ARBOR, MI 48104 (313) 662-3104

Report Date: 08/14/85

Results by Sample

Prepared for:
SAIC-ETG
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention. RICHARD GREILING

Client P.O.: CONTRACT
Report #: 210
Samples Rec'd: 08-13-85
SAMPLE DATES: 07-22/23/24-85

Approved: Thomas Cullen
Refer Questions to:
THOMAS CULLEN

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	TZ11-32	TZ12-53
ERG Sample Number	133763	133766
Matrix	08/134833	08/134834
Parameter	NATURAL WATER	NATURAL WATER
PURGEABLE AROMATICS		
BENZENE mg/L	0.00086	0.0012
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

ANALYTICAL REPORT

erg.
ENVIRONMENTAL RESEARCH GROUP, INC
117 N FIRST ST
ANN ARBOR, MI 48104 (313) 662-3104

Project: ~~A3314~~ A3107.12
Report Date: 09/06/85

Results by Sample

Prepared for:
SAIC/JRB ASSOCIATES
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860014-90
Report #: 223
Samples Rec'd: 08-22-85
Sample Date: 08-20-85

Approved:
Refer Questions to:
ROBYN WOOLEY
**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	AZ08	AZ09-28	AZ09-28QC	AZ07	DZ03-15	DZ03-40
Collected	082001	082002	082003	082004	082005	082006
ERG Sample Number	08-20-85	08-20-85	08-20-85	08-20-85	08-20-85	08-20-85
Matrix	08/135164	08/135165	08/135166	08/135167	08/135168	08/135169
Parameter	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER	NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.00096	0.0027	0.0088	0.00019	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0014	0.0014	0.0011	0.0011	0.0011	0.0013
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

See last page for explanation of symbols
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ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC

Project: ~~A2314/3~~ A3107.12

Report Date: 06 SEP 1985

	0707	LC5-30
Client ID	082007	082008
Collected	08-20-85	08-20-85
ERG Sample Number	08/135170	08/135171
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.04	0.013
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	0.0046
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0085	0.2
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	0.00043

Project Comments:

Comments about sample 08/135171
PURGEABLES, 601 - AVERAGE OF DUPLICATE RUNS
PURGEABLE AROMATICS - AVERAGE OF DUPLICATE RUNS

Note Results indicated by '#' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
\- = Test not requested for this sample

erg.

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC
117 N FIRST ST
ANN ARBOR, MI 48104 (313) 662-3104

Project: ~~A3314.1-1~~
A3107.1212

Report Date: 09/06/85

Results by Sample

Prepared for:
SAIC/JRB ASSOCIATES
13400-B NORTHRUP WAY
SUITE 38
BELLEVUE, WA 98005
Attention: RICHARD GREILING

Client P.O.: 16-860014-90
Report #: 224
Samples Rec'd: 09-05-85
Sample Date: 08-20-85

Approved:
Refer Questions to:
THOMAS CULLEN JR.

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID ERG Sample Number Matrix Parameter	A708 135164 09/136119 NATURAL WATER	AZ09-28 135165 09/136120 NATURAL WATER	AZ09-28QC 135166 09/136121 NATURAL WATER	A707 165167 09/136122 NATURAL WATER	DZ03-15 135168 09/136123 NATURAL WATER	DZ03-40 135169 09/136124 NATURAL WATER
PURGEABLE AROMATICS						
BENZENE mg/L	ND (0.0002)	0.007	0.0045	0.0028	0.001	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
PURGEABLES, 601						
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	<0.0001	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.0016	0.0015	0.0015	0.0012	0.0021	0.0019
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)	ND (0.00003)

 See last page for explanation of symbols

CONTINUED

Client ID	D207	LC5-30
	135170	135171
ERG Sample Number	09/136125	09/136126
Matrix	NATURAL WATER	NATURAL WATER
Parameter		
PURGEABLE AROMATICS		
BENZENE mg/L	ND (0.0002)	ND (0.0002)
DICHLOROBENZENE, 1,2- mg/L	ND (0.00015)	ND (0.00015)
DICHLOROBENZENE, 1,3- mg/L	ND (0.00032)	ND (0.00032)
DICHLOROBENZENE, 1,4- mg/L	ND (0.00024)	ND (0.00024)
ETHYLBENZENE mg/L	ND (0.0002)	ND (0.0002)
TOLUENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROBENZENE mg/L	ND (0.00025)	ND (0.00025)
PURGEABLES, 601		
CHLOROMETHANE mg/L	ND (0.00008)	ND (0.00008)
BROMOMETHANE mg/L	ND (0.0012)	ND (0.0012)
DICHLORODIFLUOROMETHANE mg/L	ND (0.0018)	ND (0.0018)
VINYL CHLORIDE mg/L	ND (0.00018)	ND (0.00018)
CHLOROETHANE mg/L	ND (0.00052)	ND (0.00052)
METHYLENE CHLORIDE mg/L	ND (0.00025)	ND (0.00025)
TRICHLOROFLUOROMETHANE mg/L	ND (0.0005)	ND (0.0005)
DICHLOROETHYLENE, 1,1- mg/L	ND (0.00013)	ND (0.00013)
DICHLOROETHANE, 1,1- mg/L	ND (0.00007)	ND (0.00007)
TRANS-1,2-DICHLOROETHYLENE mg/L	0.025	0.0081
CHLOROFORM mg/L	ND (0.00005)	ND (0.00005)
DICHLORETHANE, 1,2- mg/L	ND (0.00003)	ND (0.00003)
TRICHLOROETHANE, 1,1,1- mg/L	ND (0.00003)	ND (0.00003)
CARBON TETRACHLORIDE mg/L	ND (0.00012)	ND (0.00012)
BROMODICHLOROMETHANE mg/L	ND (0.0001)	ND (0.0001)
DICHLOROPROPANE, 1,2- mg/L	ND (0.00004)	ND (0.00004)
TRANS-1,3-DICHLOROPROPENE mg/L	ND (0.00034)	ND (0.00034)
TRICHLOROETHYLENE mg/L	0.011	0.11
DIBROMOCHLOROMETHANE mg/L	ND (0.00009)	ND (0.00009)
TRICHLOROETHANE, 1,1,2- mg/L	ND (0.00002)	ND (0.00002)
CIS-1,3-DICHLOROPROPENE mg/L	ND (0.0002)	ND (0.0002)
CHLOROETHYLVINYL ETHER, 2- mg/L	ND (0.00013)	ND (0.00013)
BROMOFORM mg/L	ND (0.0002)	ND (0.0002)
TETRACHLOROETHANE, 1,1,2,2- mg/L	ND (0.00003)	ND (0.00003)
TETRACHLOROETHYLENE mg/L	ND (0.00003)	ND (0.00003)

Note Results indicated by '*' are in mg/Kg instead of mg/L
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged

SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

APPENDIX G

SEISMIC REFRACTION AND ELECTRICAL RESISTIVITY DATA

G.1 - Seismic Refraction Data

G.2 - Electrical Resistivity Data

G.3 - Self Potential Data

Appendix G.1

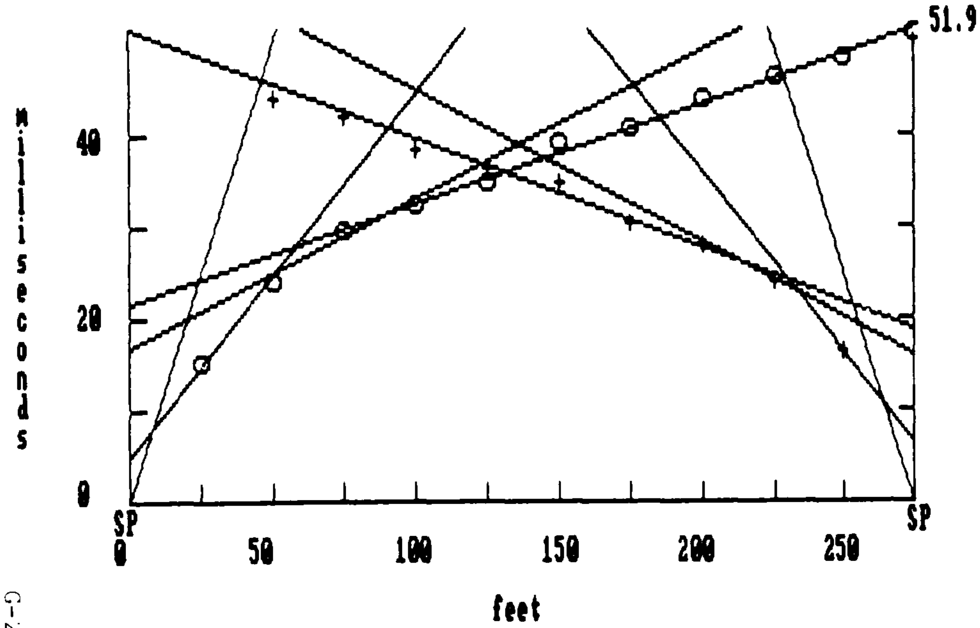
Seismic Refraction Data

SEISMIC REFRACTION DATA

Seismic refraction data as of May, 1985 from each field station at McChord Air Force Base and the American Lake Gardens Tract, Washington are listed on the following pages along with each time-distance curve and its computer modeled interpretation. Models were calculated using REFRMODL, a proprietary seismic refraction modeling computer program authored by B.D. Rodriguez of James K. Applegate Associates, Inc., Denver, Colorado. Below is an explanation of column headings and parameters.

V1, V2, V3, V4	=	Velocities in ft/msec.
GP	=	Geophone.
STATION	=	Distance in ft of geophone from instrument end of shotpoint.
ELEV	=	Elevations of surface data points and various geologic units.
TIME FORWARD/REVERSE	=	Forward and reverse compressional wave arival times at each geophone.
WT	=	Water table.
TILL	=	Vashon Till.
ESP	=	Esperance Sands (Colvos Sands, Vashon Advance Outwash).

Vel.(unit/msec): V1= 1.0 V2a= 2.5 V2b= 2.5 V3a= 6.1 V3b= 6.0 V4a= 9.0 V4b= 8.3

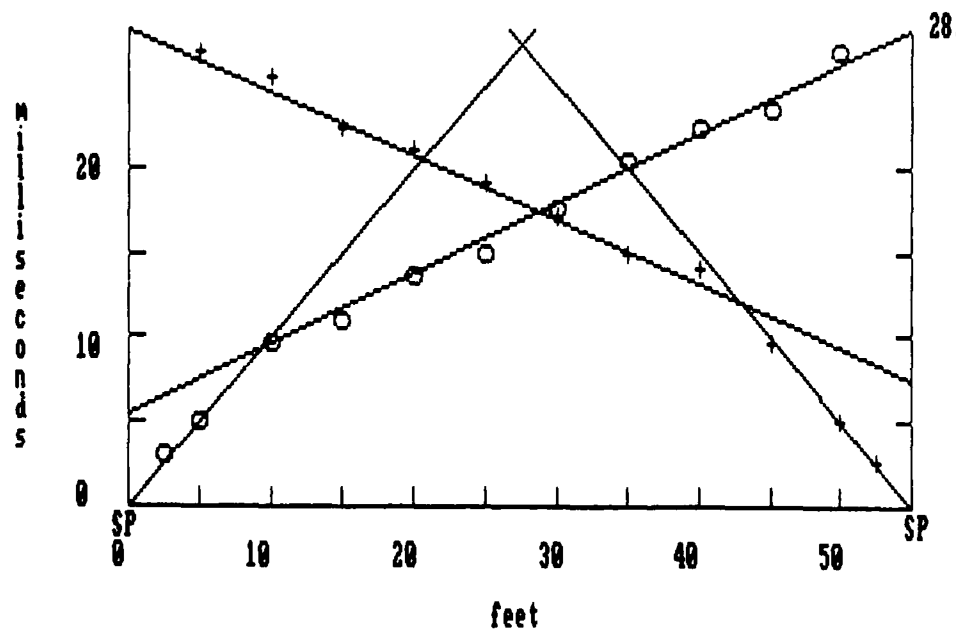


SPREAD 01

V1 = 1.0 V2 = 2.5 V3 = 6.0 V4 = 8.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	272	0	52	251		
25		15				
50		24	44			
75		29.5	42			
100		32.5	38.5			
125		35	36.5			
150	269	39.5	35		238	
175		41	30.5			
200		44	28			
225		46.5	24			
250		48.5	16.5			
275	272	51.5	0	256		

Vel.(unit/msec): V1= 1.0 V2a= 2.4 V2b= 2.6 V3a= 0.0 V3b= 0.0 V4a= 0.0 V4b= 0.0

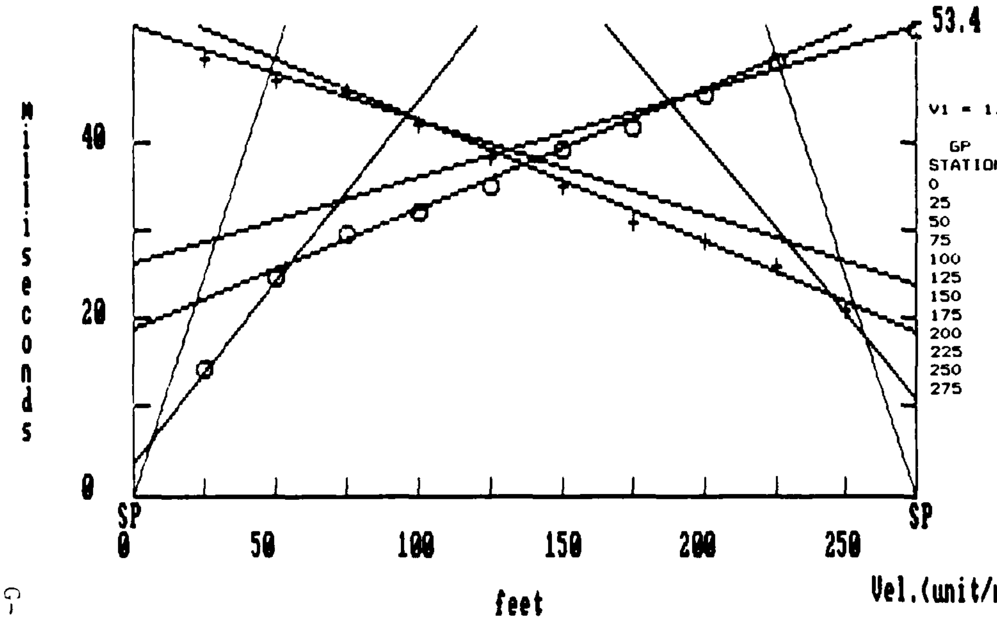


SPREAD 02

V1 = 1.0 V2 = 2.0 V3 = 6.3 V4 = 8.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	272	0	55	251		
25		14.5	53			
50		28				
75	273	33	49		239	
100		34	43.5			
125		37	41.5			
150		39	36.5			
175		43	31.5			
200		45	26.5			
225		49	24			
250		53	20.5			
275	266	56	0	254		

Vel.(unit/msec): V1= 1.0 V2a= 2.4 V2b= 2.6 V3a= 7.3 V3b= 7.3 V4a=10.1 V4b= 9.3

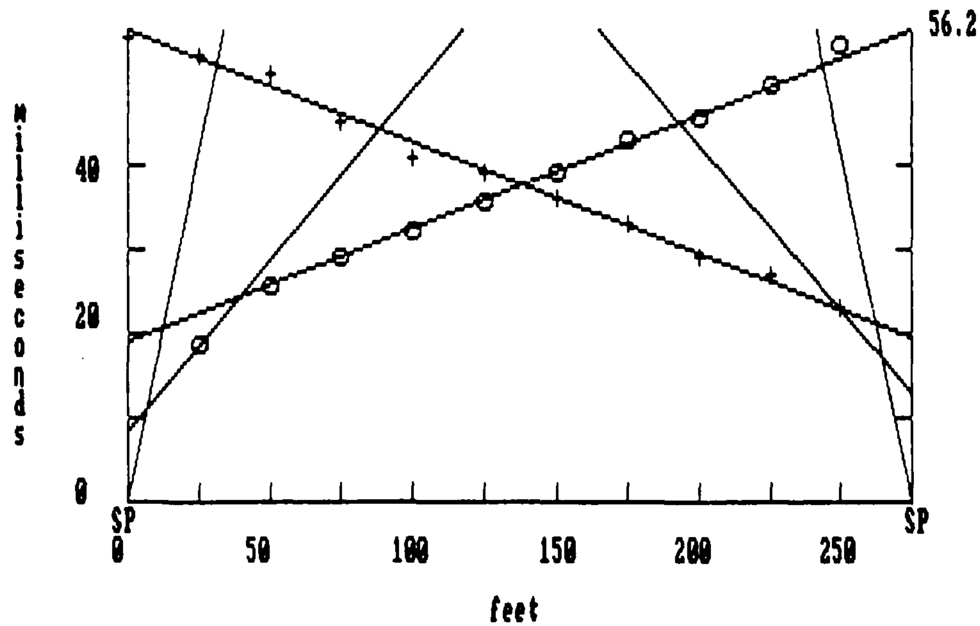


SPREAD 03

V1 = 1.0 V2 = 2.5 V3 = 7.0 V4 = 9.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	271	0			214	
25		14.5	49.5			
50		24.5	47			
75	270	29.5	46	251		
100	270	32	42	253		
125	270	35	38.5	253		
150	270	39	35	253		
175	270	41.5	31	255		
200	270	45.5	29	253		
225	270	49	26	252		
250			21			
275	271	53	0		231	

Vel.(unit/msec): V1= 0.6 V2a= 2.4 V2b= 2.6 V3a= 7.4 V3b= 7.5 V4a= 0.0 V4b= 0.0

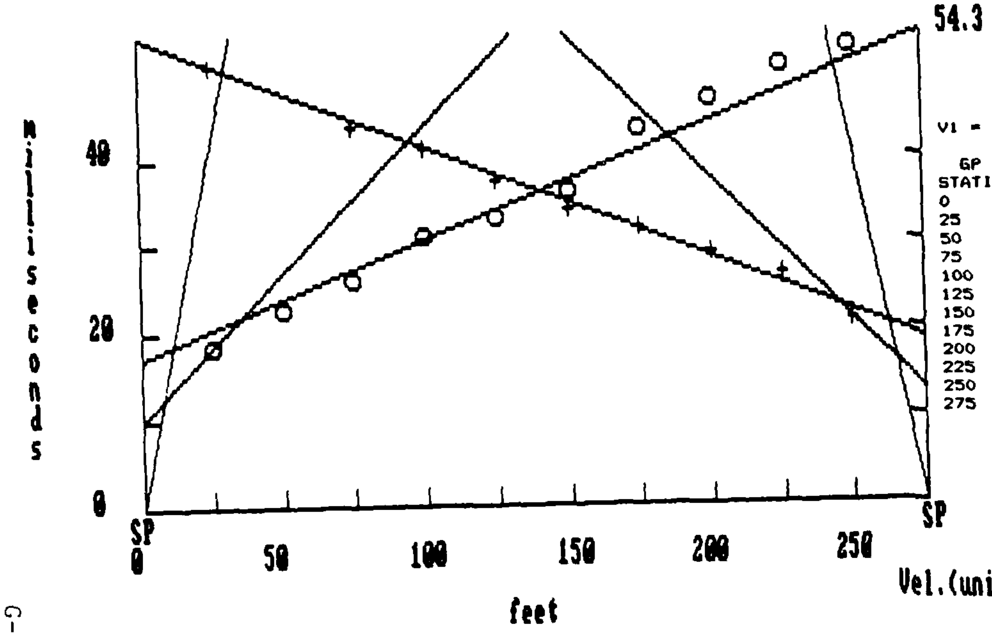


SPREAD 04

V1 = 0.6 V2 = 2.5 V3 = 7.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	55			
25		18.5	53			
50	271	25.5	51	255		
75	271	29	45	257		
100	271	32	41	259		
125	272	35.5	39	257		
150	272	39	36	257		
175	271	43	33	255		
200	271	45.5	29	257		
225	271	49.5	27	254		
250	270	54.5	23	252		
275		57	0			

Vel.(unit/msec): V1= 0.6 V2a= 2.9 V2b= 3.1 V3a= 7.4 V3b= 7.8 V4a= 0.0 V4b= 0.0

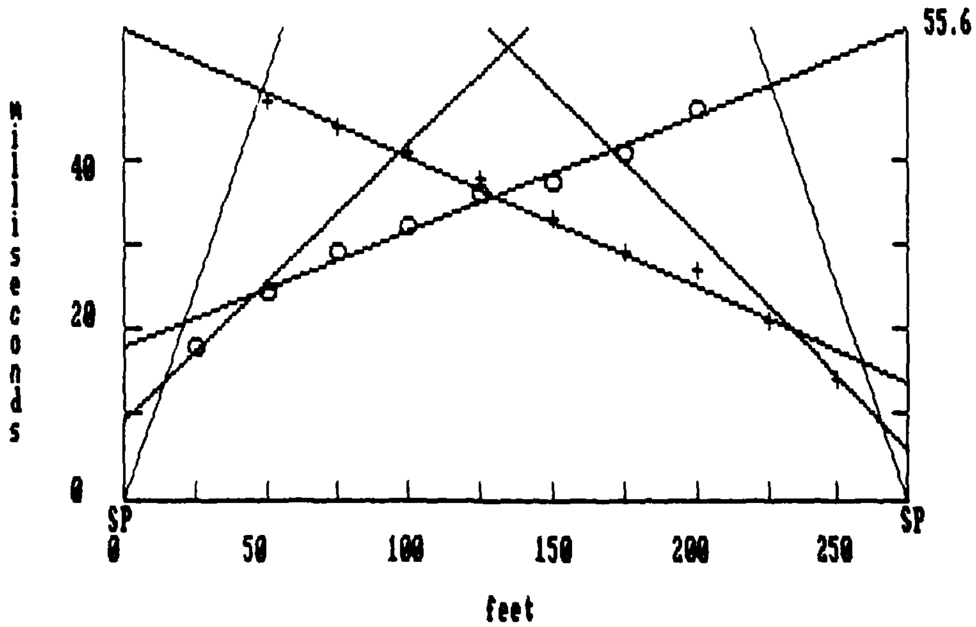


SPREAD 05

V1 = 0.6 V2 = 3.0 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25		18.5	51			
50		22.5				
75	269	26	43.5	260		
100	270	31	41	257		
125	275	33	37.5	264		
150	275	36	34	265		
175	276	43	32	258		
200	275	46.5	29	256		
225	277	50.5	26.5	255		
250		52.5	21			
275		55	0			

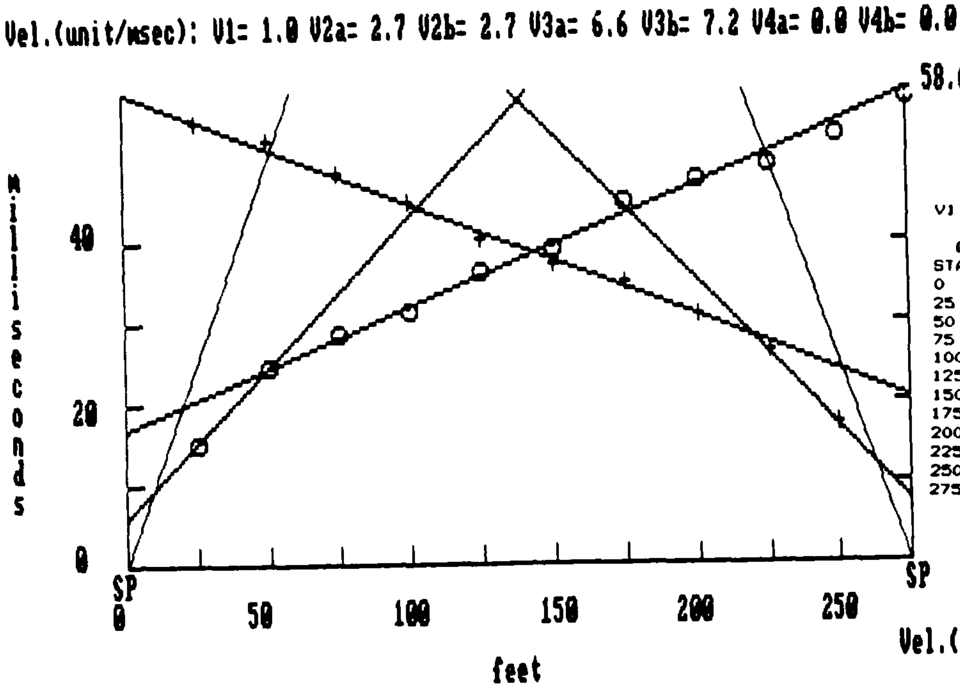
Vel.(unit/msec): V1= 1.0 V2a= 3.1 V2b= 2.9 V3a= 7.3 V3b= 6.6 V4a= 0.0 V4b= 0.0



SPREAD 06

V1 = 1.0 V2 = 3.0 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25		18				
50	270	24.5	47	253		
75	271	29	44	251		
100	271	32	41	251		
125	271	36	38	249		
150	271	37.5	33	256		
175	271	41	29	256		
200	271	46	27	252		
225			21			
250			14			
275			0			



SPREAD 07

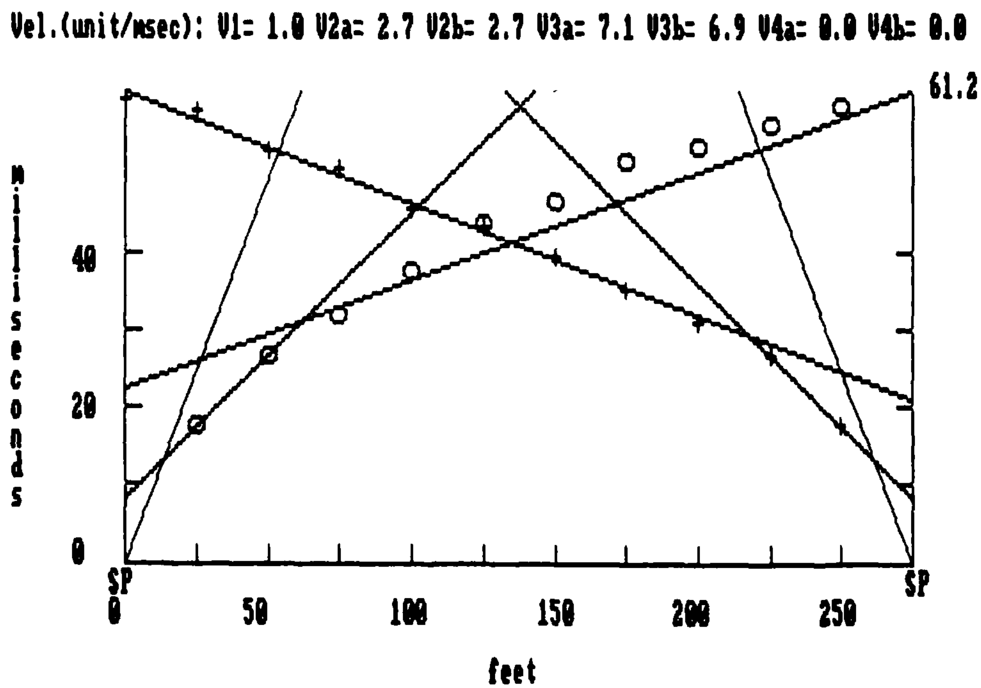
V1 = 1.0 V2 = 2.7 V3 = 6.8

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25		15	55			
50	274	24.5	52.5	254		
75	274	28.5	48.5	253		
100	274	31	45	255		
125	274	36	40.5	254		
150	274	39	37	255		
175	274	45	35	249		
200	273	47.5	30.5	252		
225		49.5	26			
250		53	17			
275		57.5	0			

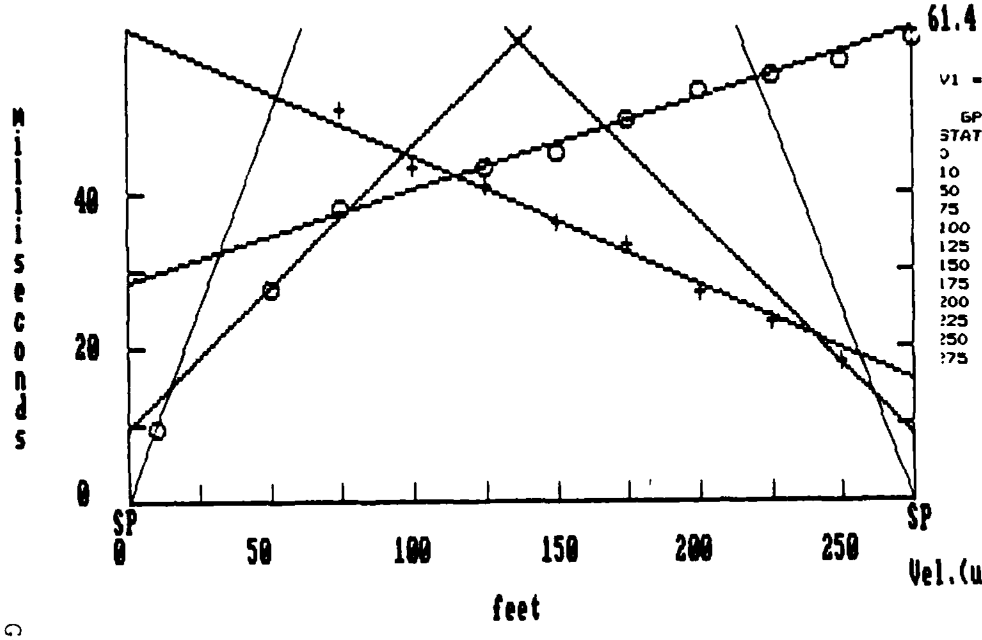
SPREAD 08

V1 = 1.0 V2 = 2.7 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	60			
25		18	58.5			
50		27	53.5			
75	271	32	51	248		
100	271	38	46	247		
125	271	44	43.5	242		
150	271	47	39.5	242		
175	271	52	35.5	241		
200	271	54	31	245		
225		57	27			
250		59	18			
275		62	0			



Vel.(unit/msec): V1= 1.0 V2a= 2.7 V2b= 2.7 V3a= 8.3 V3b= 6.0 V4a= 0.0 V4b= 0.0



SPREAD 09

V1 = 1.0 V2 = 2.7 V3 = 7.0

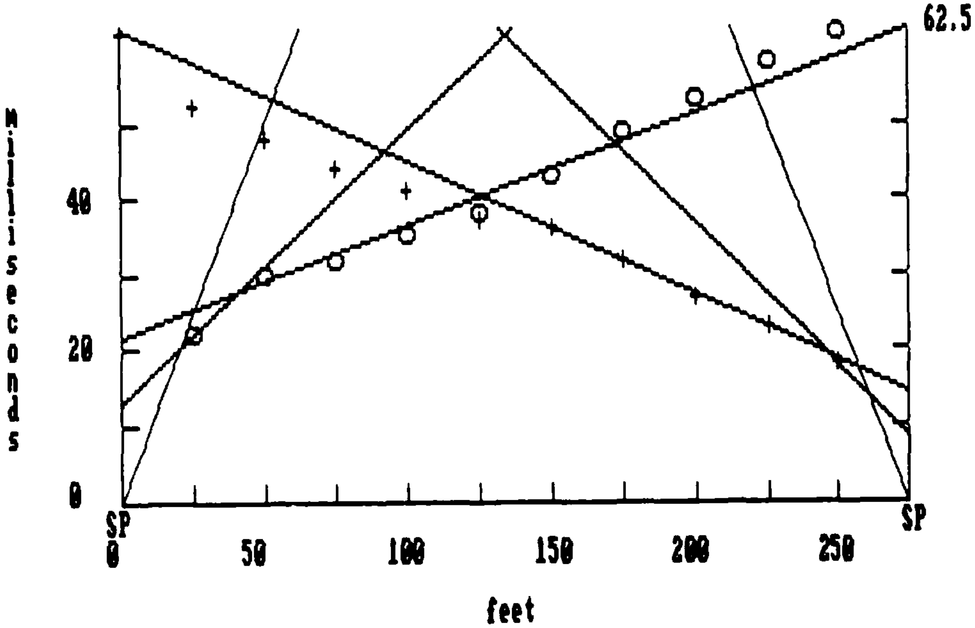
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
10		9.5				
50		27.5				
75	275	38	51	244		
100			43			
125	275	43	41	251		
150	275	45	36	256		
175	275	49.5	33	254		
200	275	53	27	258		
225	275	55	23	261		
250		57	18			
275		60	0			

SPREAD 10

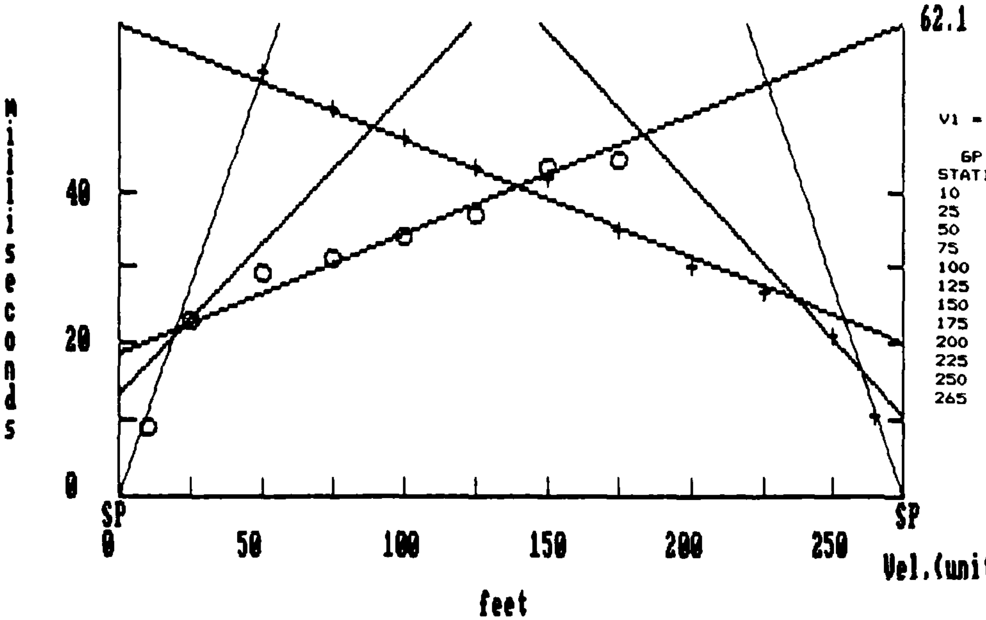
V1 = 1.0 V2 = 2.7 V3 = 6.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		22	52			
50	270	30	48	258		
75	270	32	44	262		
100	271	35	41	262		
125	271	38	37	264		
150	271	43	36	258		
175	272	49	32	256		
200	274	53	27	259		
225	275	58	23	259		
250		62	18			
275		64	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.8 V2b= 2.6 V3a= 6.8 V3b= 5.7 V4a= 0.0 V4b= 0.0



Vel.(unit/msec): V1= 0.9 V2a= 2.5 V2b= 2.5 V3a= 6.3 V3b= 6.5 V4a= 0.0 V4b= 0.0

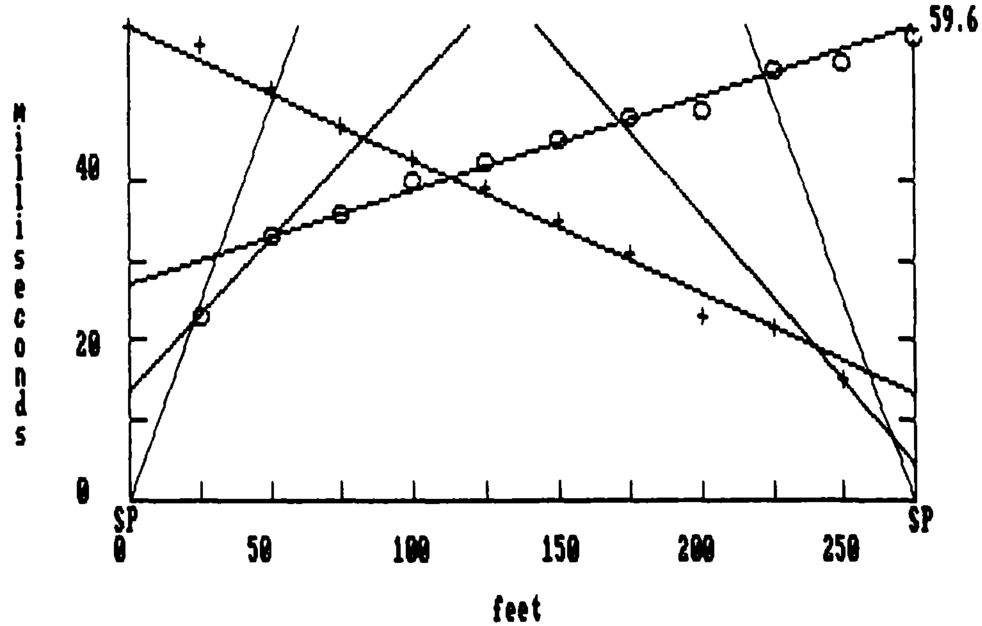


SPREAD 11

V1 = 0.9 V2 = 2.5 V3 = 6.5 V4 = 10.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
10	276	9			235	
25		23				
50	275	29	56	262		
75	274	31	51	259		
100	273	34	47	260		
125	273	37	43	261		
150	273	43	42	254		
175	271	44	35	260		
200			30			
225			27			
250			21			
265			10.5			

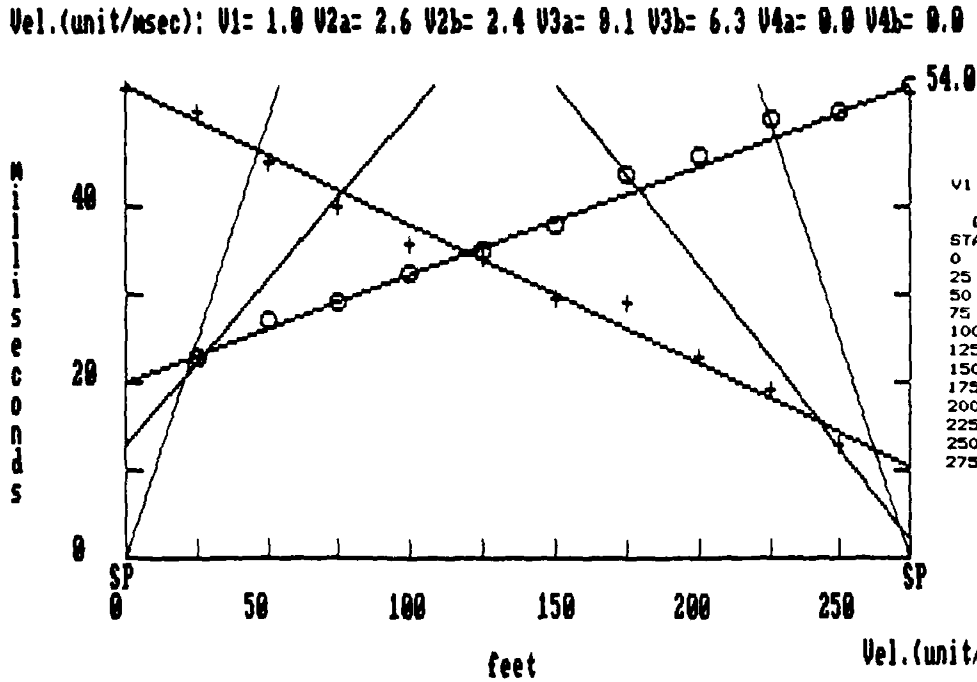
Vel.(unit/msec): V1= 1.0 V2a= 2.6 V2b= 2.4 V3a= 8.4 V3b= 5.9 V4a= 0.0 V4b= 0.0



SPREAD 12

V1 = 1.0 V2 = 2.5 V3 = 7.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	59.5			
25		23	57			
50	277	33	51.5	252		
75	277	36	47	254		
100	277	40	43	254		
125	275	42.5	39	254		
150	268	45	35	249		
175	267	48	31	250		
200	267	49	23	258		
225	270	54	21.5	257		
250		55	15			
275		58	0			



SPREAD 13

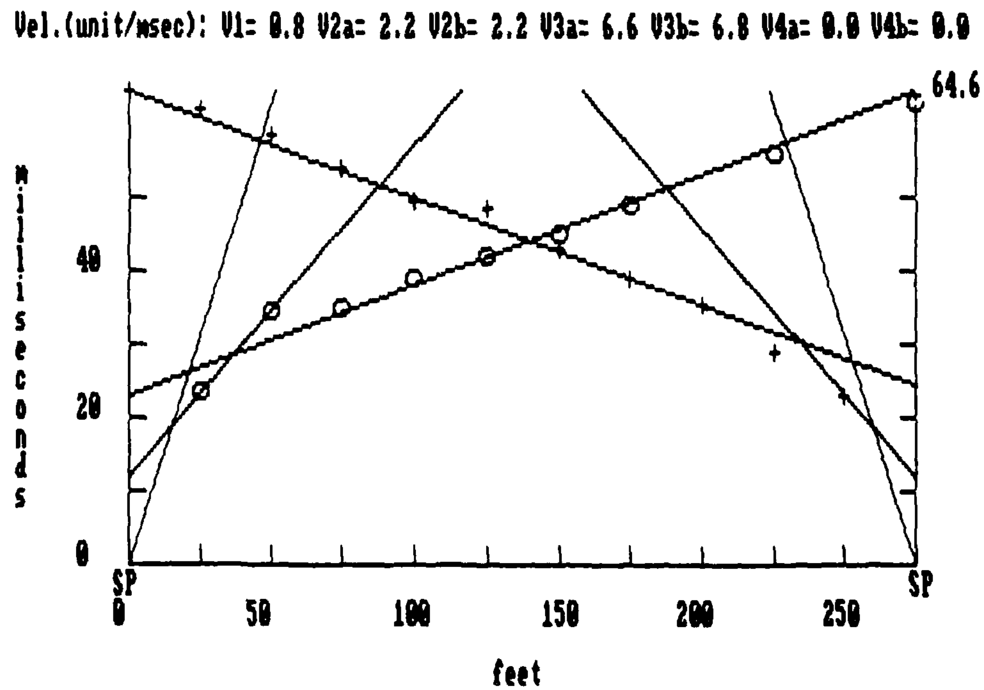
V1 = 1.0 V2 = 2.5 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	53.5			
25	275	23	51	255		
50	274	27	45	256		
75	273	29	40	259		
100	275	32.5	36	262		
125	277	35	34	263		
150	281	38	29.5	269		
175	284	44	29	265		
200	286	46	23	272		
225	287	50	19	273		
250		51	13			
275		54	0			

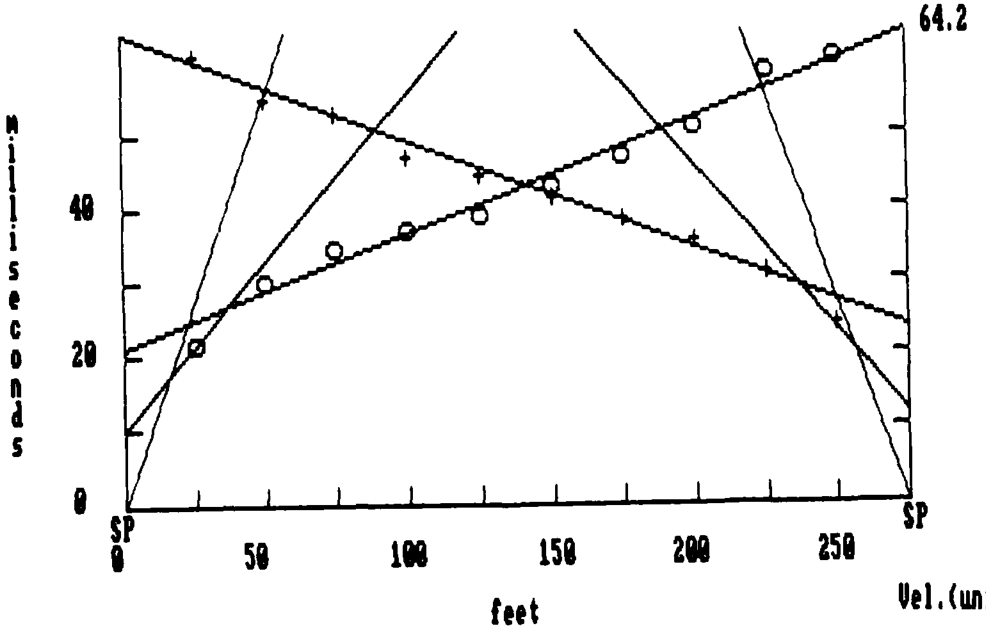
SPREAD 14

V1 = 0.8 V2 = 2.2 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	64.5			
25		23.5	62			
50		34.5	58.5			
75	277	35	54	258		
100	276	39	49.5	258		
125	277	42	48.5	256		
150	276	45	43	258		
175	275	49	39	257		
200			35.5			
225	275	56	29	260		
250			23			
275		63	0			



Vel.(unit/msec): V1= 0.9 V2a= 2.2 V2b= 2.2 V3a= 6.4 V3b= 6.7 V4a= 0.0 V4b= 0.0



SPREAD 15

V1 = 0.9 V2 = 2.2 V3 = 6.5

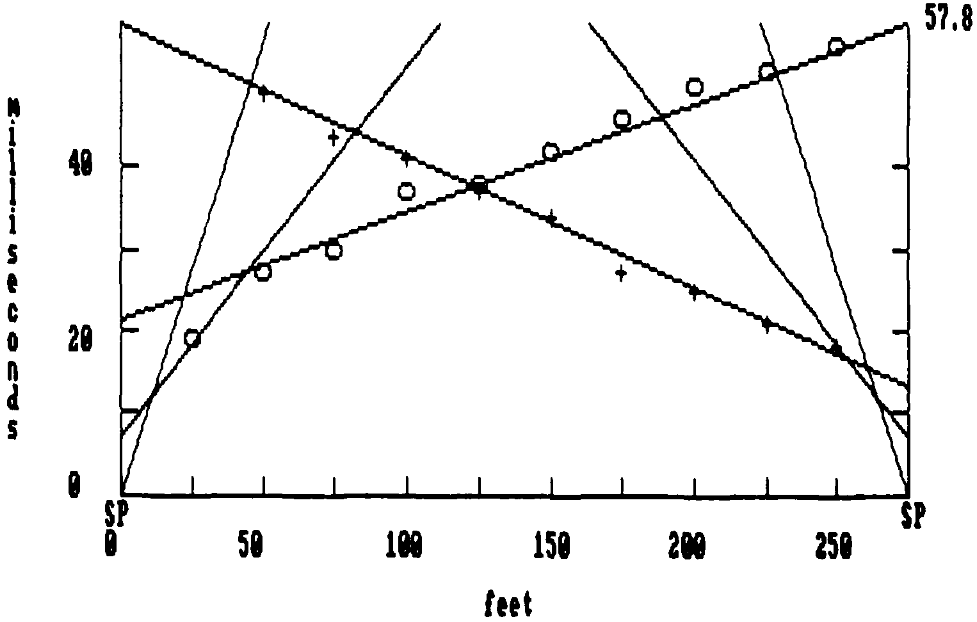
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	64.5			
25		21.5	61			
50	276	30	55	260		
75	277	34.5	53	258		
100	276	37	47	262		
125	276	39	44.5	262		
150	277	43	41.5	261		
175	277	47	38.5	260		
200	277	51	35.5	259		
225	277	58.5	31	256		
250		60.5	24			
275		64.5	0			

SPREAD 16

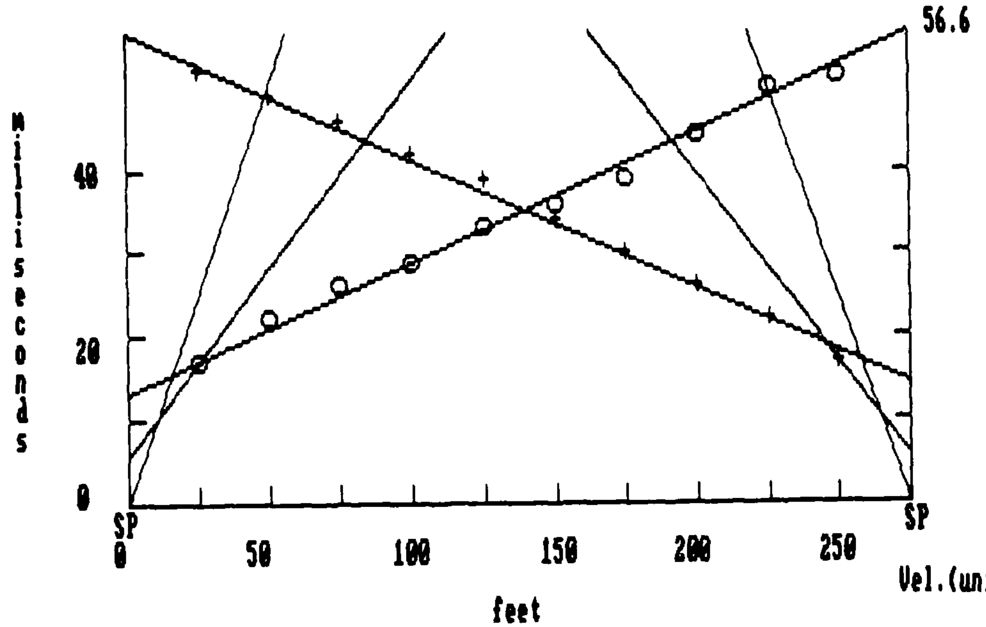
V1 = 0.9 V2 = 2.2 V3 = 6.8

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	58			
25		19				
50	274	27	49	258		
75	272	30	44	259		
100	271	37	41	253		
125	269	38	37	254		
150	266	42	34	250		
175	264	46	27	252		
200	263	50	25	249		
225	263	52	21	251		
250	262	55	18	250		
275		58	0			

Vel.(unit/msec): V1= 0.9 V2a= 2.2 V2b= 2.2 V3a= 7.6 V3b= 6.2 V4a= 0.0 V4b= 0.0



Vel.(unit/msec): V1= 1.0 V2a= 2.2 V2b= 2.2 V3a= 6.3 V3b= 6.5 V4a= 0.0 V4b= 0.0

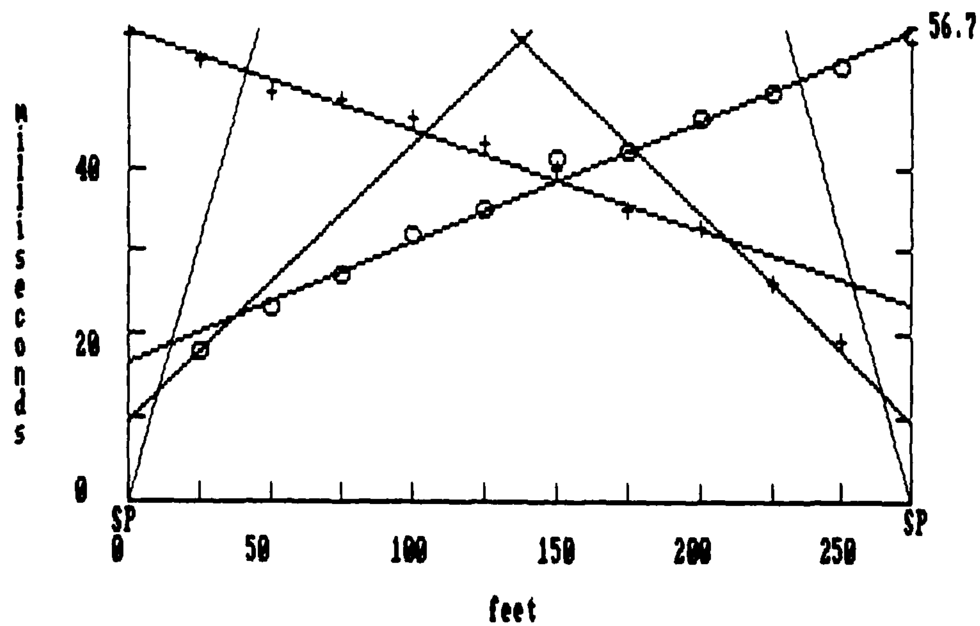


SPREAD 17

V1 = 1.0 V2 = 2.2 V3 = 6.4

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	57			
25	273	17	52	263		
50	271	22	49	258		
75	269	26	46	255		
100	267	29	42	254		
125	265	33	39	251		
150	264	36	34	252		
175	264	39	30	253		
200	264	44	26	252		
225	265	50	22	251		
250		51	17			
275		57	0			

Vel.(unit/msec): V1= 0.8 V2a= 3.0 V2b= 3.0 V3a= 6.9 V3b= 8.3 V4a= 0.0 V4b= 0.0

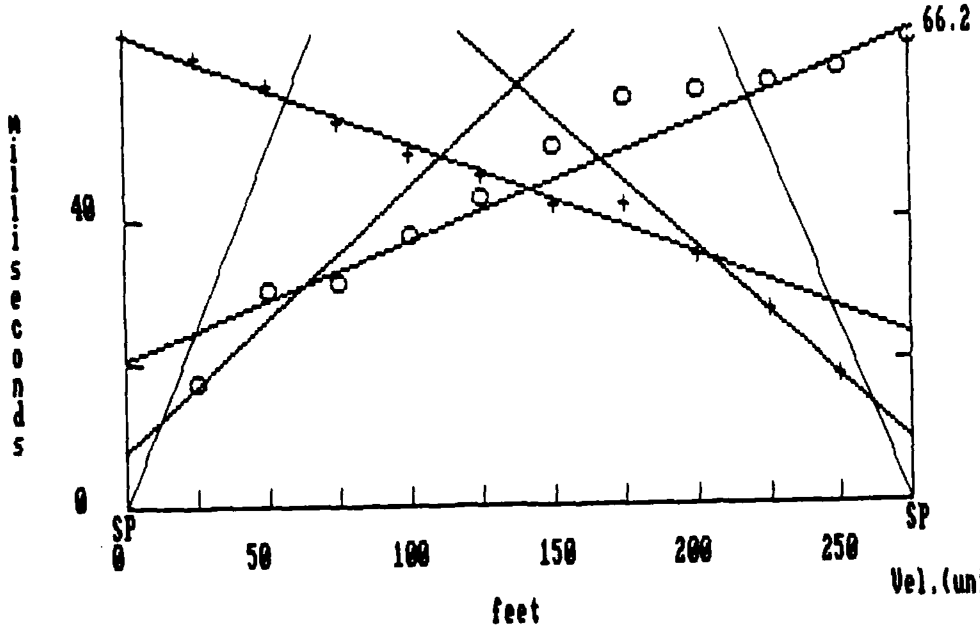


SPREAD 18

V1 = 0.8 V2 = 3.0 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	56			
25		18	53			
50	276	23	49	264		
75	277	27	48	259		
100	277	32	46	254		
125	276	35	43	253		
150	276	41	40	249		
175	277	42	35	256		
200	278	46	33	253		
225		49	26			
250		52	19			
275		56	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.7 V2b= 2.7 V3a= 6.0 V3b= 6.4 V4a= 0.0 V4b= 0.0

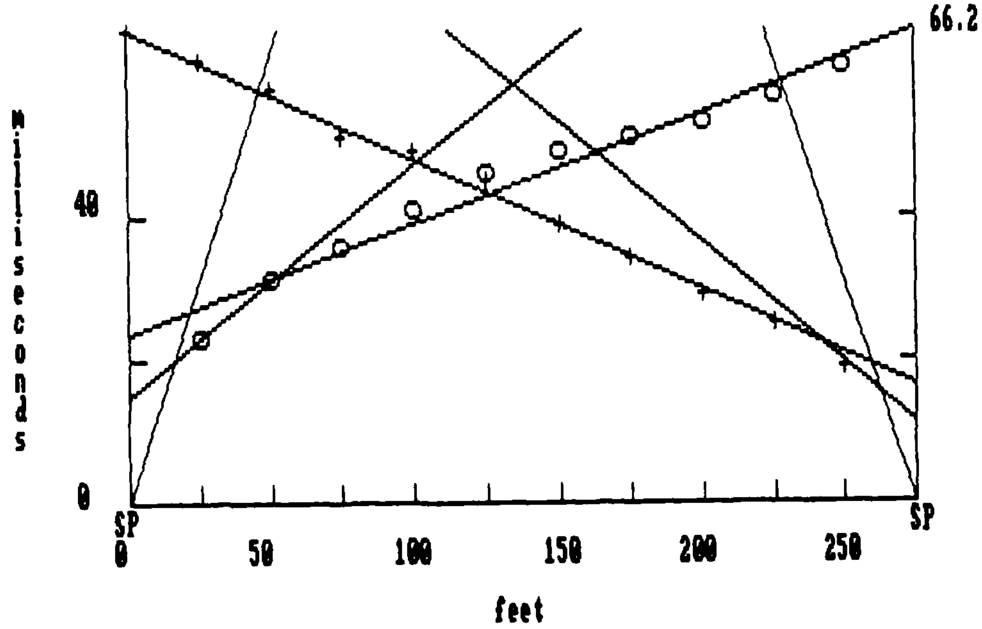


SPREAD 19

V1 = 1.0 V2 = 2.7 V3 = 6.2

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	66			
25		17	63			
50	276	30	59	249		
75	274	31	54	254		
100	273	38	49	250		
125	272	43	46	246		
150	272	50	42	241		
175	272	57	42	230		
200	272	58	35	239		
225		59	27			
250		61	18			
275		65	0			

Vel.(unit/msec): V1= 0.8 V2a= 3.1 V2b= 2.9 V3a= 6.4 V3b= 5.5 V4a= 0.0 V4b= 0.0

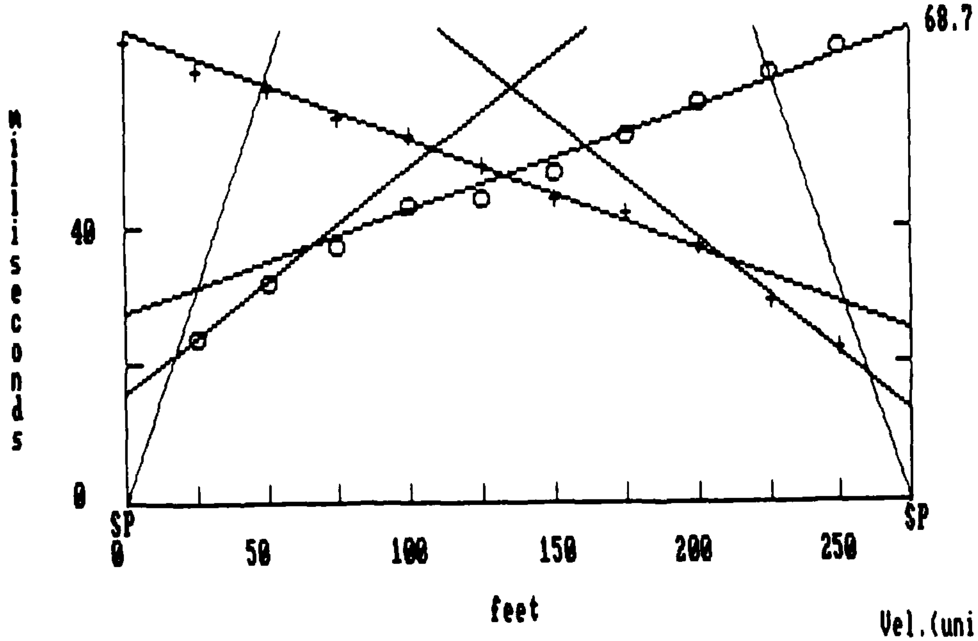


SPREAD 20

V1 = 0.8 V2 = 3.0 V3 = 6.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	66			
25		23	62			
50	284	31	58	261		
75	283	36	51	264		
100	282	41	49	258		
125	281	46	45	254		
150	277	49	39	256		
175	275	51	34	259		
200	272	53	29	262		
225	270	57	25	259		
250		61	19			
275		67	0			

Vel.(unit/msec): V1= 0.8 V2a= 3.0 V2b= 3.0 V3a= 6.6 V3b= 6.3 V4a= 0.0 V4b= 0.0



SPREAD 21

V1 = 0.8 V2 = 3.0 V3 = 6.5

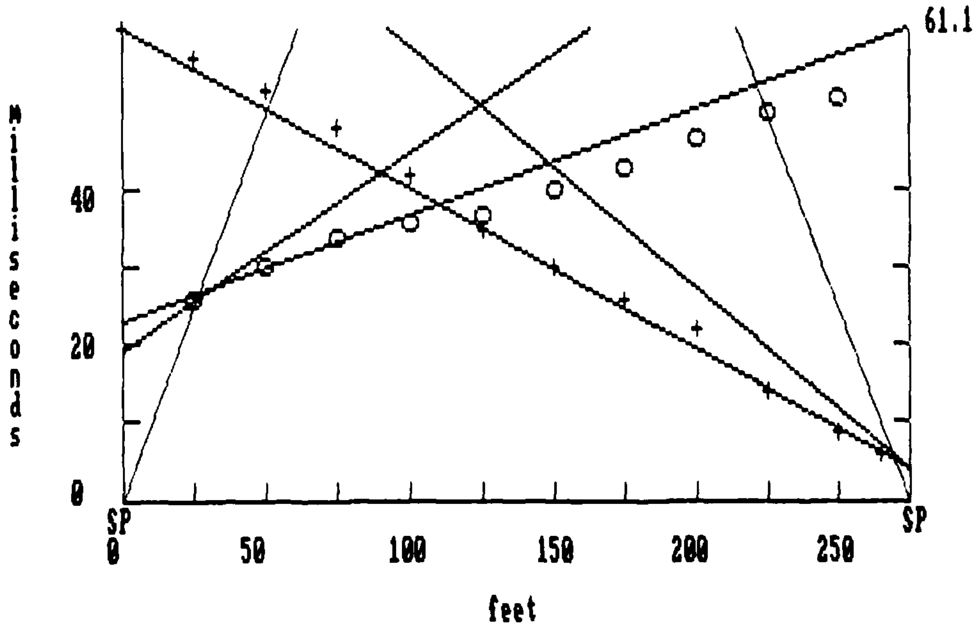
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	67			
25		24	63			
50		32	60			
75	283	37	56	262		
100	283	43	53	256		
125	282	44	49	260		
150	282	48	44	262		
175	282	53	42	257		
200	282	58	37	256		
225		62	29			
250		66	22			
275		70	0			

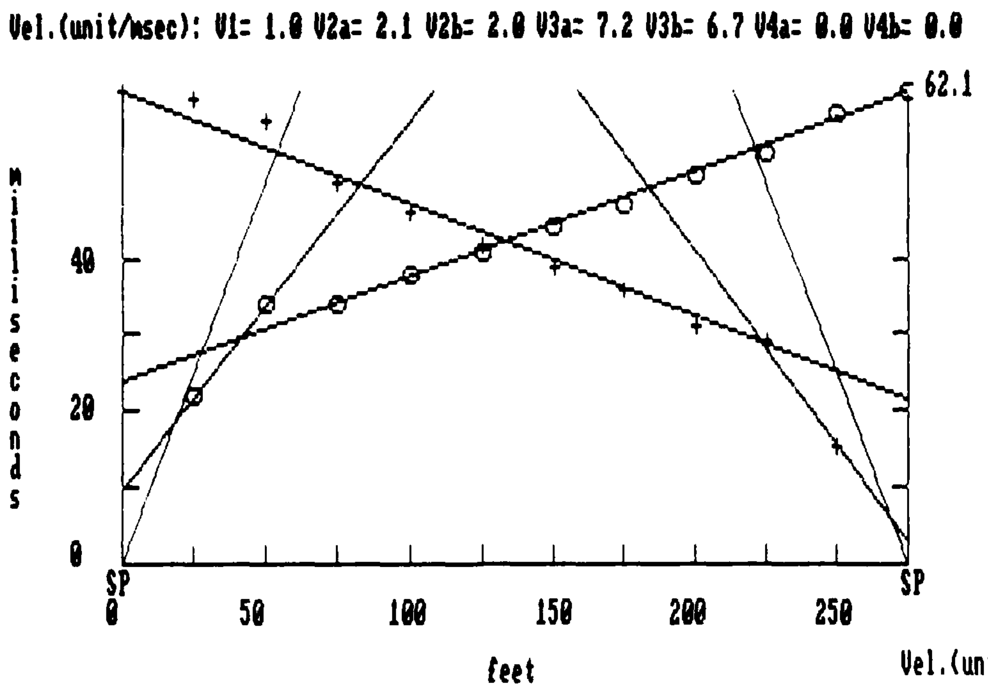
SPREAD 22

V1 = 1.0 V2 = 3.5 V3 = 6.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	61			
25		26	57			
50	282	30	53	254		
75	283	34	48	258		
100	284	36	42	267		
125	285	37	35	281		
150		40	30			
175		43	26			
200		47	22			
225		50	14			
250		52	9			
265			6			

Vel.(unit/msec): V1= 1.0 V2a= 3.9 V2b= 3.2 V3a= 7.2 V3b= 4.8 V4a= 0.0 V4b= 0.0

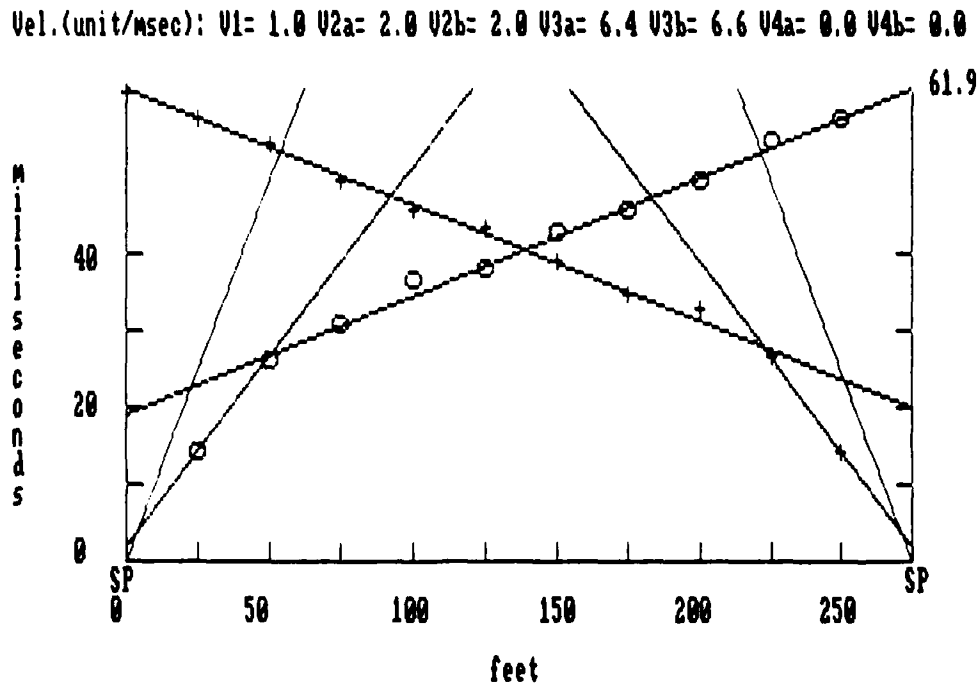




SPREAD 23

V1 = 1.0 V2 = 2.0 V3 = 7.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		22	61			
50	279	34	58	251		
75	278	34	50	259		
100	278	38	46	258		
125	277	41	42	259		
150	277	44	39	259		
175	277	47	36	259		
200	277	51	31	260		
225	277	54	29	259		
250		59	15			
275		62	0			

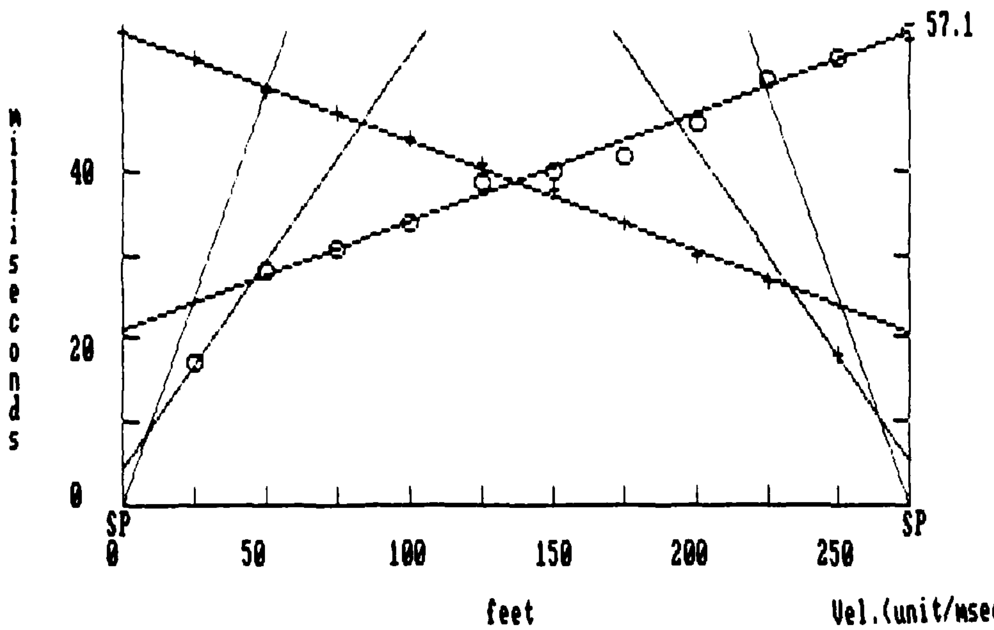


SPREAD 24

V1 = 1.0 V2 = 2.0 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	61.5			
25		14	58			
50		26	54.5			
75	281	31	50	262		
100	280	37	46	259		
125	280	38	43.5	260		
150	280	43	39	260		
175	280	46	35	261		
200	279	50	33	258		
225		55	26.5			
250		58	14			
275		62	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 7.6 V3b= 7.5 V4a= 0.0 V4b= 0.0



SPREAD 25

V1 = 1.0 V2 = 2.0 V3 = 7.5

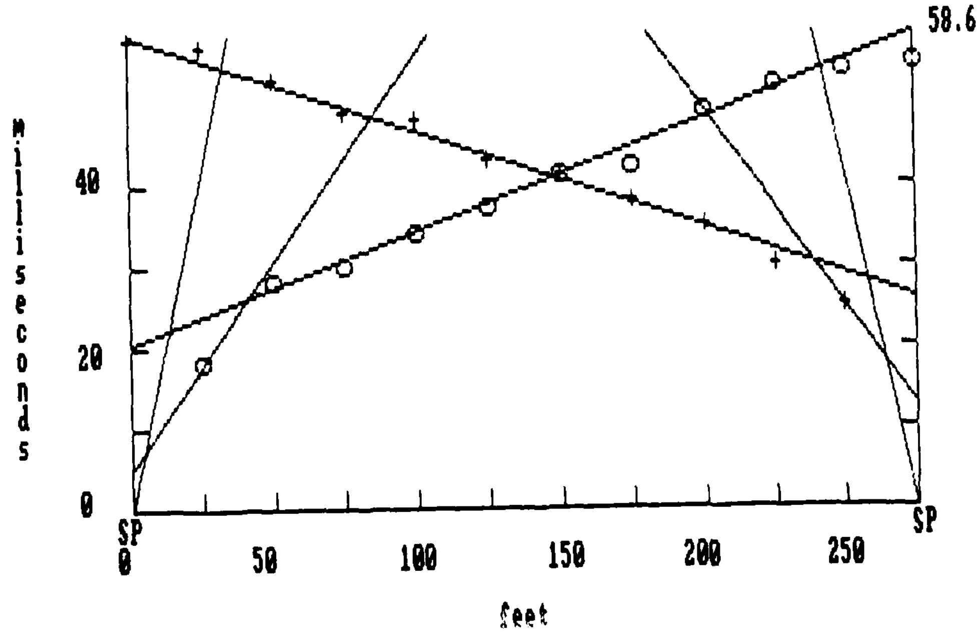
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	57			
25		17	54			
50	277	28	50	258		
75	276	31	47	258		
100	276	34	44	258		
125	276	39	41	255		
150	275	40	38	257		
175	275	42	34	258		
200	275	46	30	259		
225	275	51	27	256		
250		54	18			
275		57	0			

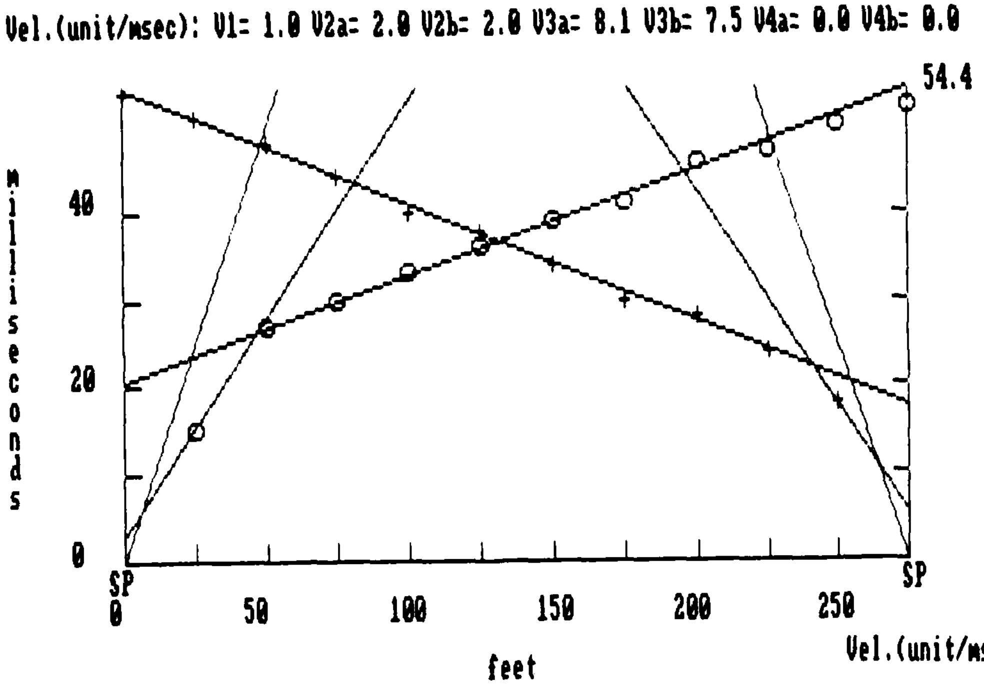
SPREAD 26

V1 = 0.6 V2 = 2.0 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	58			
25		18	57			
50	279	28	53	263		
75	279	30	49	265		
100	279	34	48	262		
125	279	37	43	264		
150	279	41	41	262		
175	279	42	38	264		
200	278	49	35	259		
225	278	52	30	261		
250		54	25			
275		55	0			

Vel.(unit/msec): V1= 0.6 V2a= 1.9 V2b= 2.1 V3a= 7.2 V3b= 8.4 V4a= 0.0 V4b= 0.0

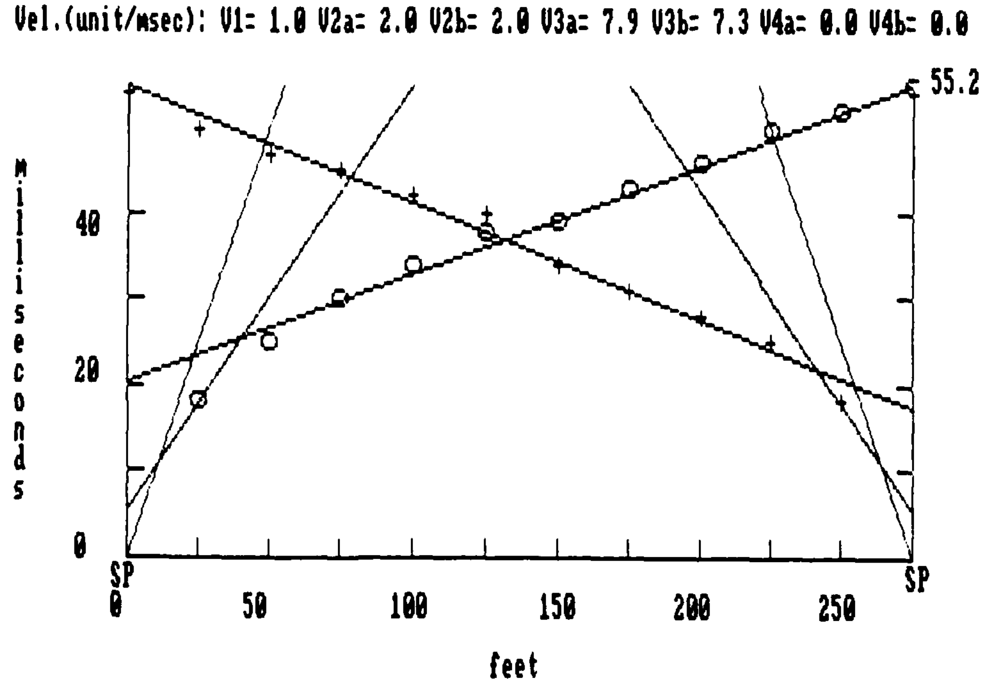




SPREAD 27

V1 = 1.0 V2 = 2.0 V3 = 7.6

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	54			
25		15	51			
50	279	27	48	260		
75	278	30	44	260		
100	278	33	40	261		
125	277	36	38	259		
150	276	39	34	259		
175	275	41	30	260		
200	275	46	28	257		
225	274	47	24	259		
250		50	18			
275		52	0			

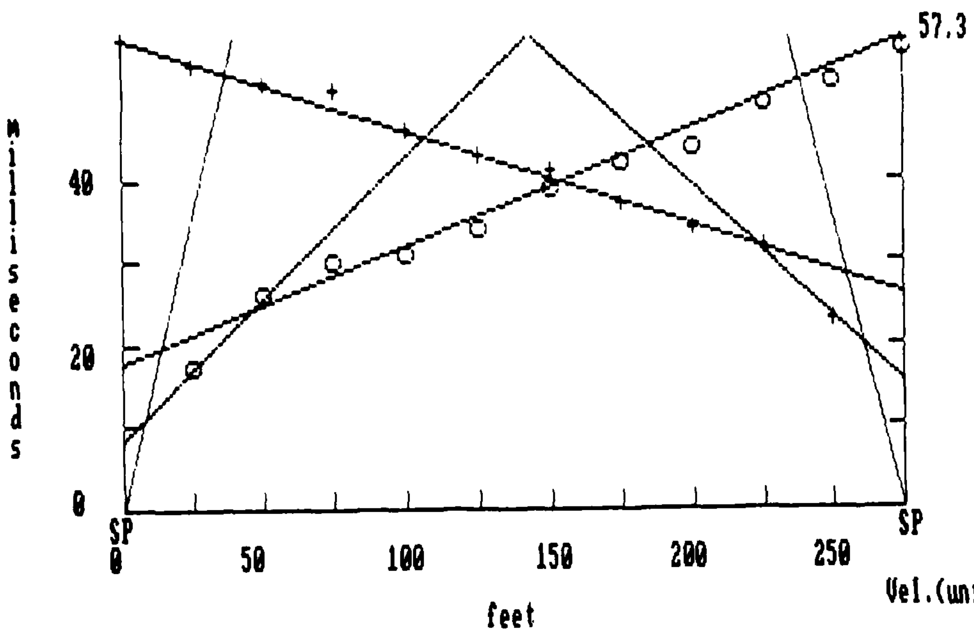


SPREAD 28

V1 = 1.0 V2 = 2.0 V3 = 7.6

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	54			
25		18	50			
50	276	25	47	262		
75	276	30	45	258		
100	275	34	42	257		
125	276	38	40	255		
150	276	39	34	260		
175	275	43	31	259		
200	275	46	28	259		
225	275	50	25	257		
250		52	18			
275		55	0			

Vel.(unit/msec): V1= 0.7 V2a= 2.9 V2b= 3.1 V3a= 6.9 V3b= 8.8 V4a= 0.0 V4b= 0.0

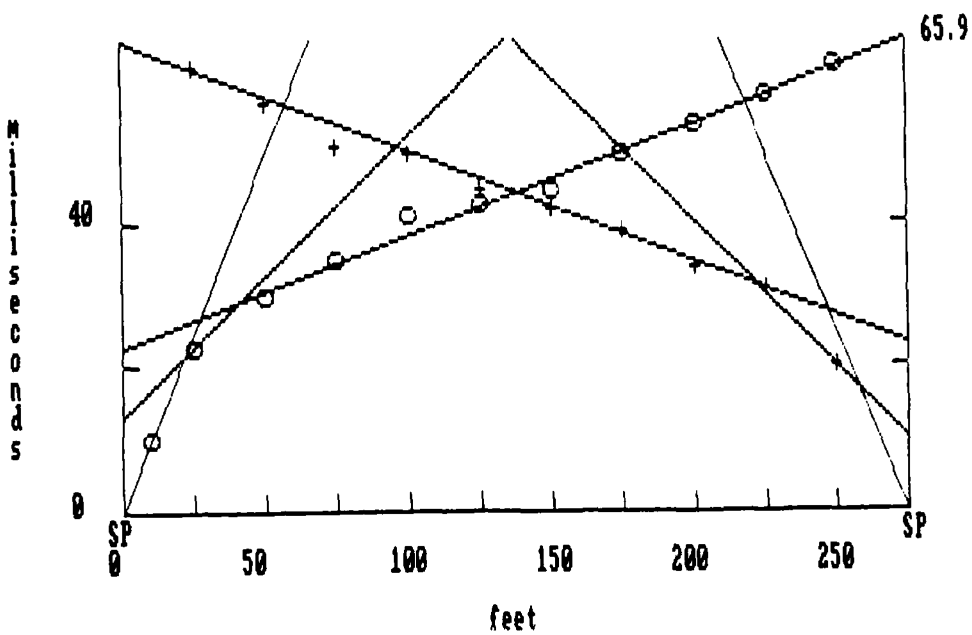


SPREAD 29

V1 = 0.7 V2 = 3.0 V3 = 7.6

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	57			
25		17	54			
50	279	26	52	260		
75	278	30	51	254		
100	279	31	46	261		
125	278	34	43	261		
150	277	39	41	255		
175	277	42	37	256		
200	276	44	34	257		
225	276	49	32	251		
250		52	23			
275		56	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.5 V2b= 2.5 V3a= 6.4 V3b= 6.5 V4a= 0.0 V4b= 0.0

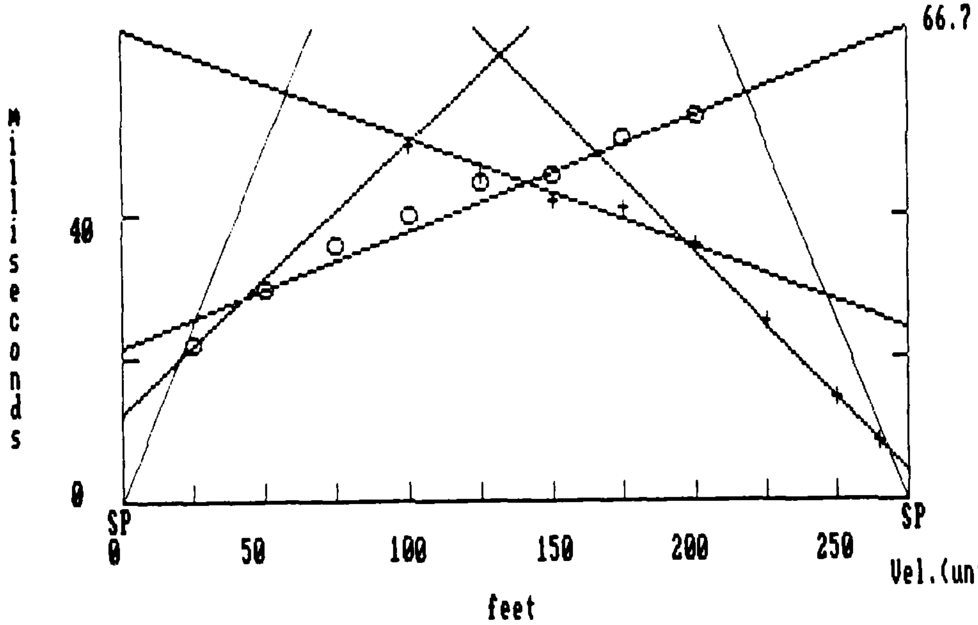


SPREAD 30

V1 = 1.0 V2 = 2.5 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
10		10				
25		23	62			
50	281	30	57	263		
75	282	35	51	264		
100	282	41	50	258		
125	282	43	45	262		
150	282	45	42	263		
175	282	50	39	261		
200	281	54	34	261		
225	281	58	31	260		
250		62	20			
275		67	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.6 V2b= 2.4 V3a= 6.1 V3b= 6.4 V4a= 0.0 V4b= 0.0

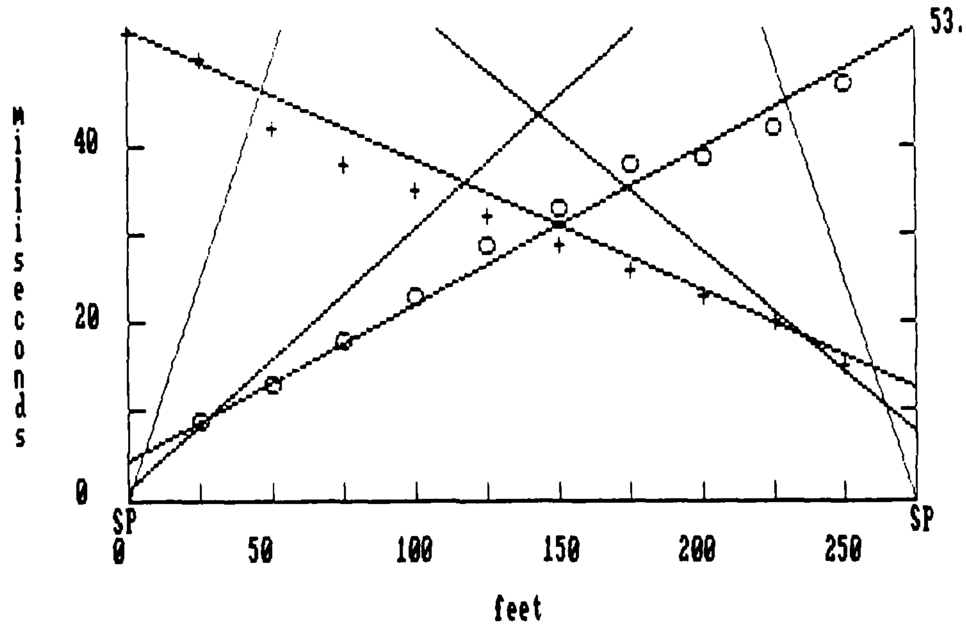


SPREAD 31

V1 = 1.0 V2 = 2.5 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25		22				
50		30				
75		36				
100	282	40	50	257		
125	282	45	46	256		
150	287	46	42	265		
175	287	51	41	259		
200	287	54	36	262		
225			25			
250			14.5			
265			8			

Vel.(unit/msec): V1= 1.0 V2a= 3.4 V2b= 3.7 V3a= 5.6 V3b= 6.7 V4a= 0.0 V4b= 0.0

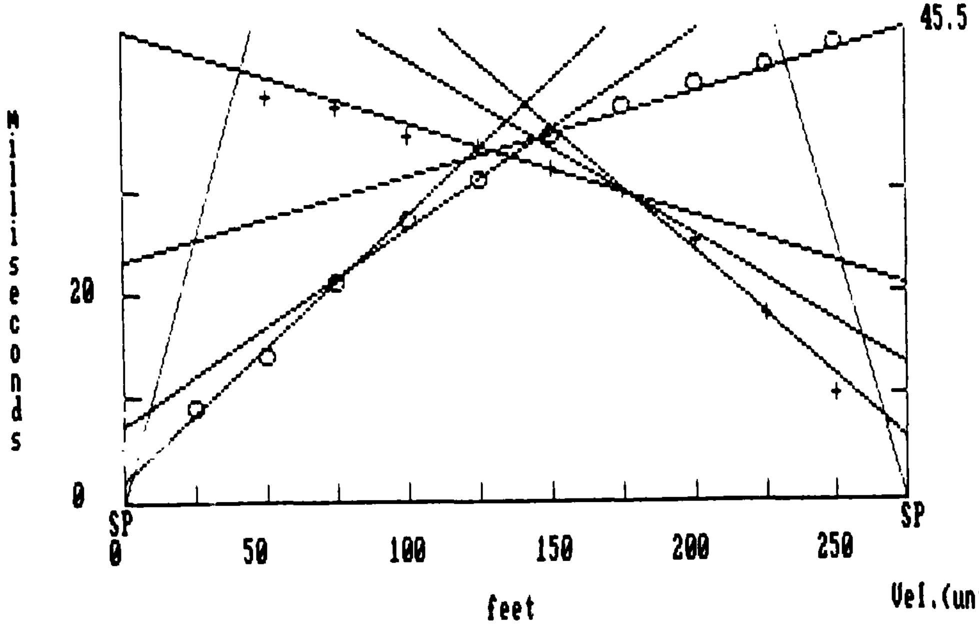


SPREAD 32

V1 = 1.0 V2 = 3.5 V3 = 6.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	53			
25		9	50			
50		13	42			
75		18	38			
100	295	23	35	292		
125	295	29	32	285		
150	294	33	29	282		
175	294	38	26	278		
200	293	39	23	281		
225	292	42	20	281		
250		47	15			
275		54	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.9 V2b= 4.1 V3a= 5.2 V3b= 5.9 V4a=12.3 V4b=11.1



SPREAD 33

V1 = 1.0 V2 = 4.0 V3 = 5.5 V4 = 11.0

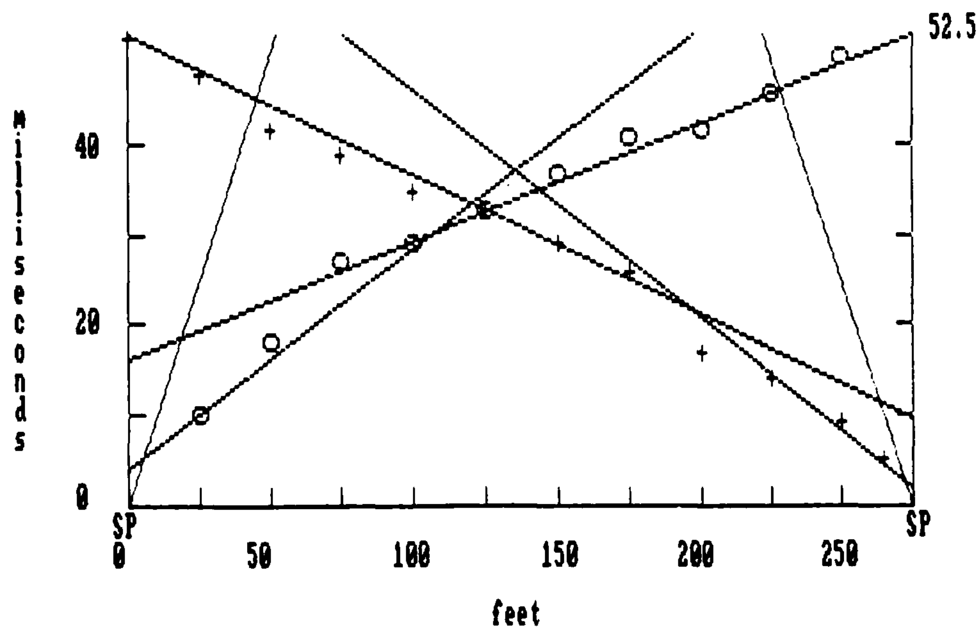
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	296	0		280		
25		9				
50		14	39			
75		21	38			
100		27	35			
125		31	34			
150	287	35	32			241
175		38	30			
200		40	25			
225		42	18			
250		44	10			
275	291		0	268		

SPREAD 34

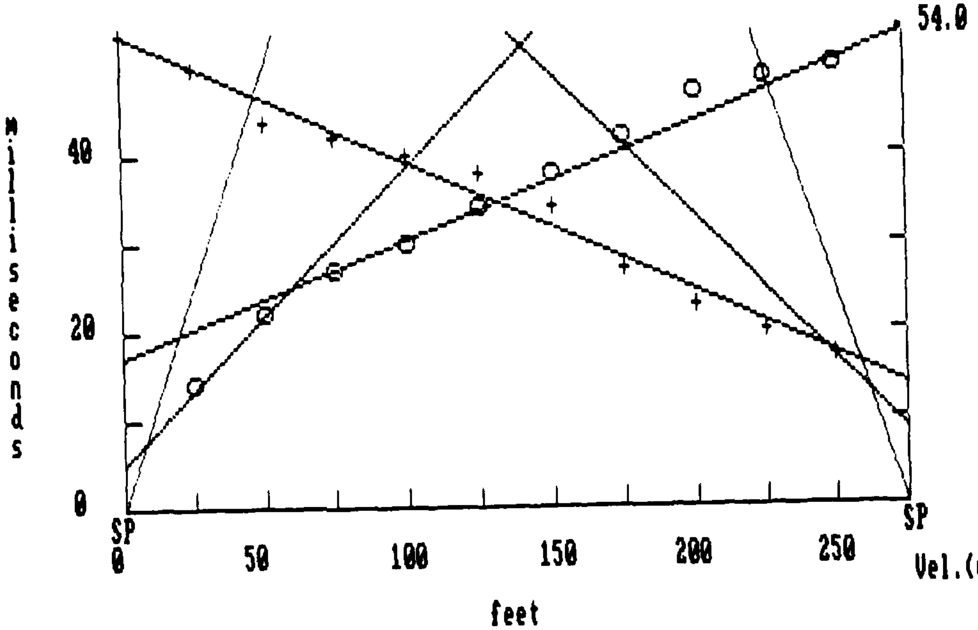
V1 = 1.0 V2 = 4.0 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	52			
25		10	48			
50		18	42			
75	295	27	39	268		
100	295	29	35	273		
125	294	33	33	267		
150	294	37	29	267		
175	294	41	26	264		
200		42	17			
225		46	14			
250		50	9			
265			5			

Vel.(unit/msec): V1= 1.0 V2a= 4.1 V2b= 3.9 V3a= 7.6 V3b= 6.4 V4a= 0.0 V4b= 0.0



Vel.(unit/msec): V1= 1.0 V2a= 2.9 V2b= 3.1 V3a= 7.4 V3b= 6.8 V4a= 0.0 V4b= 0.0

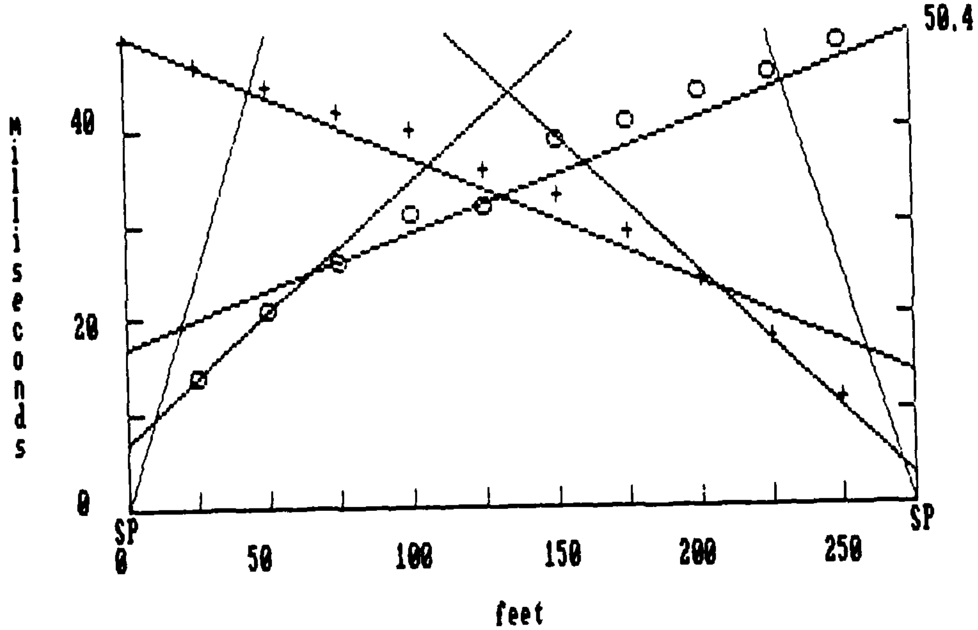


SPREAD 35

V1 = 1.0 V2 = 3.0 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	54			
25		14	50			
50		22	44			
75	307	27	42	290		
100	310	30	40	291		
125	312	34	38	290		
150	315	38	34	293		
175	315	42	27	298		
200	314	47	23	295		
225	311	49	20	294		
250		50	17			
275			0			

Vel.(unit/msec): V1= 1.0 V2a= 3.6 V2b= 3.4 V3a= 8.3 V3b= 7.5 V4a= 0.0 V4b= 0.0

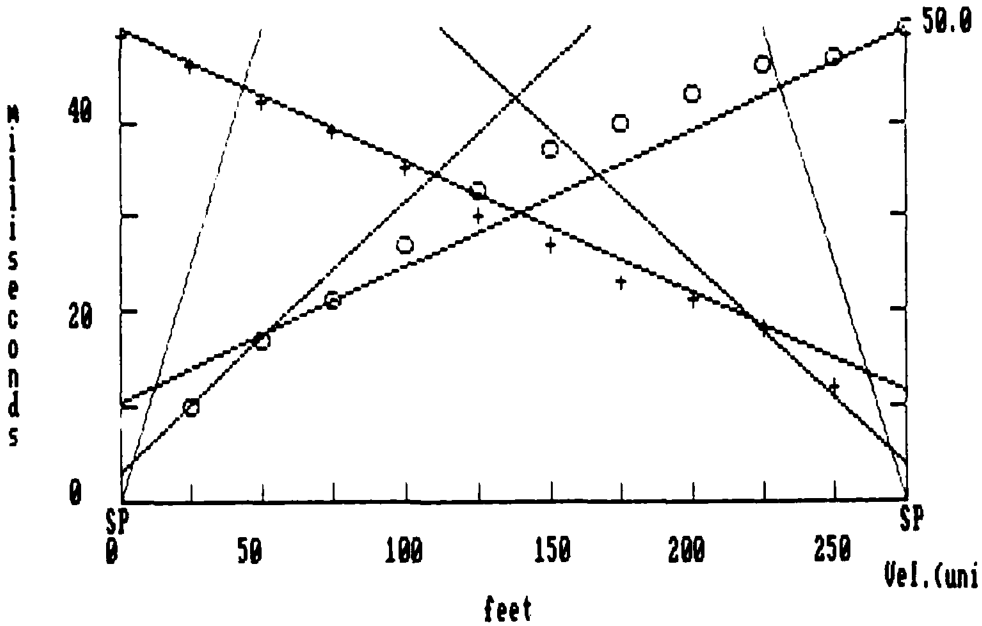


SPREAD 36

V1 = 1.0 V2 = 3.5 V3 = 8.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	50			
25		14	47			
50		21	45			
75	284	26	42	257		
100	283	31	40	250		
125	282	32	36	255		
150	282	39	33	247		
175	282	41	29	251		
200	284	44	24	256		
225		46	18			
250		49	11			
275			0			

Vel.(unit/msec): V1= 1.0 V2a= 3.5 V2b= 3.5 V3a= 6.9 V3b= 7.1 V4a= 0.0 V4b= 0.0

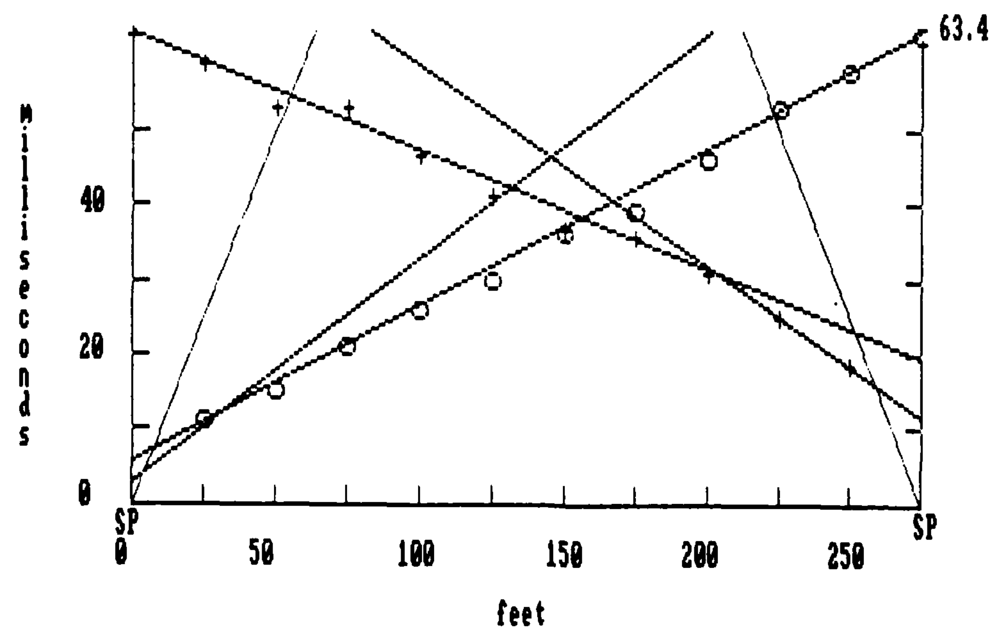


SPREAD 37

V1 = 1.0 V2 = 3.5 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	49			
25		10	46			
50		17	42			
75	326	21	39	312		
100	321	27	35	302		
125	315	33	30	295		
150	309	37	27	287		
175	303	40	23	283		
200	298	43	21	275		
225		46	18			
250		47	12			
275		50	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.3 V2b= 3.7 V3a= 4.8 V3b= 6.3 V4a= 0.0 V4b= 0.0

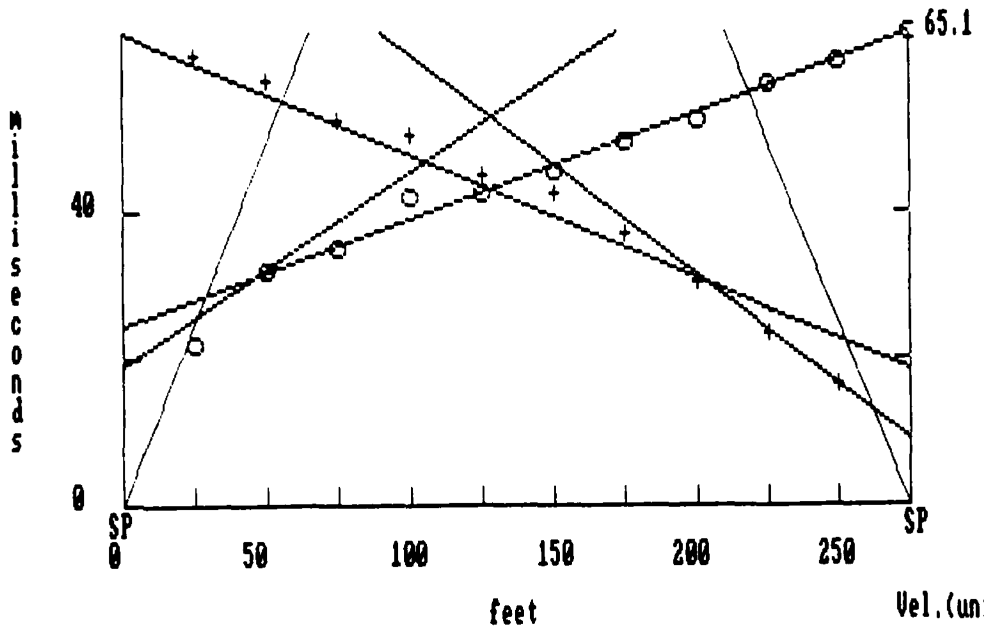


SPREAD 38

V1 = 1.0 V2 = 3.5 V3 = 5.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	63			
25		11	59			
50		15	53			
75	324	21	53	314		
100	319	26	46.5	312		
125	313	30	41	310		
150	306	36	36.5	299		
175	299	39	35.5	287		
200	293	46	31	276		
225		53	25			
250		58	18.5			
275		63	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.8 V2b= 3.3 V3a= 6.8 V3b= 5.9 V4a= 0.0 V4b= 0.0

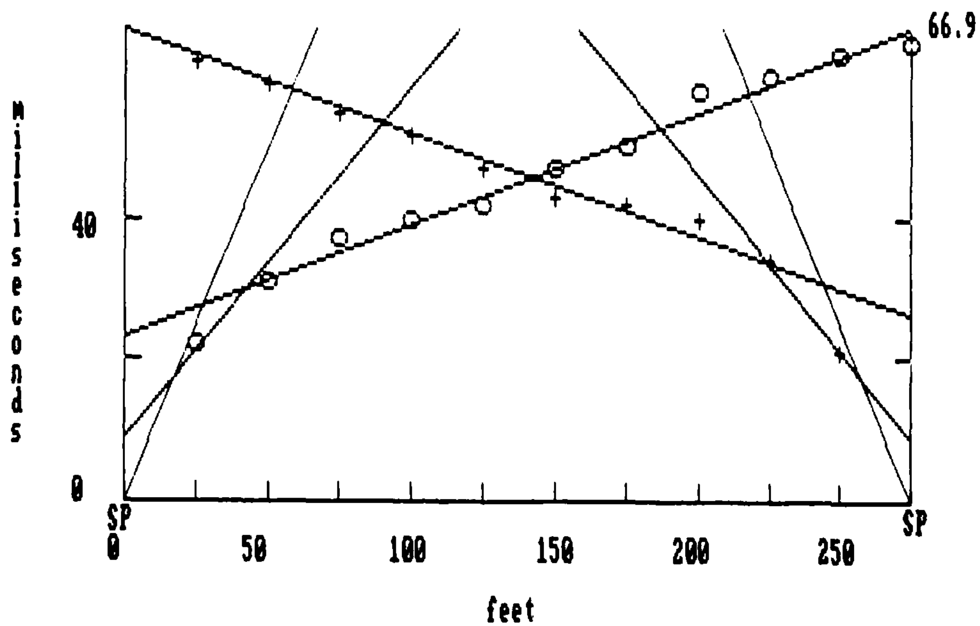


SPREAD 39

V1 = 1.0 V2 = 3.5 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	66.5			
25		22	62			
50	282	32	58.5	251		
75	282	35	53	256		
100	282	42	51	246		
125	281	43	45.5	254		
150	281	46	42.5	254		
175	281	50	37	257		
200	281	53	30.5	265		
225		58	23.5			
250		61	16.5			
275		65	0			

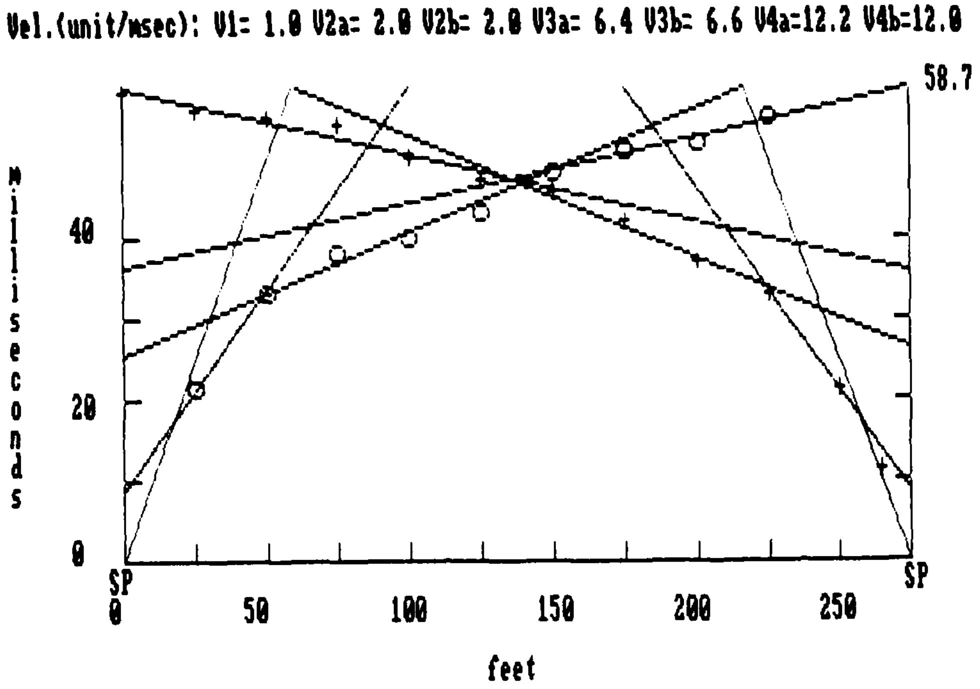
Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 6.3 V3b= 6.7 V4a= 0.0 V4b= 0.0



SPREAD 40

V1 = 1.0 V2 = 2.0 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	67			
25		22	62			
50	281	31	59	262		
75	282	37	55	261		
100	282	40	52	261		
125	283	42	47	265		
150	283	47	43	264		
175	284	50	42	263		
200	285	58	40	258		
225	285	60	34	261		
250		63	21			
275		65	0			



SPREAD 41

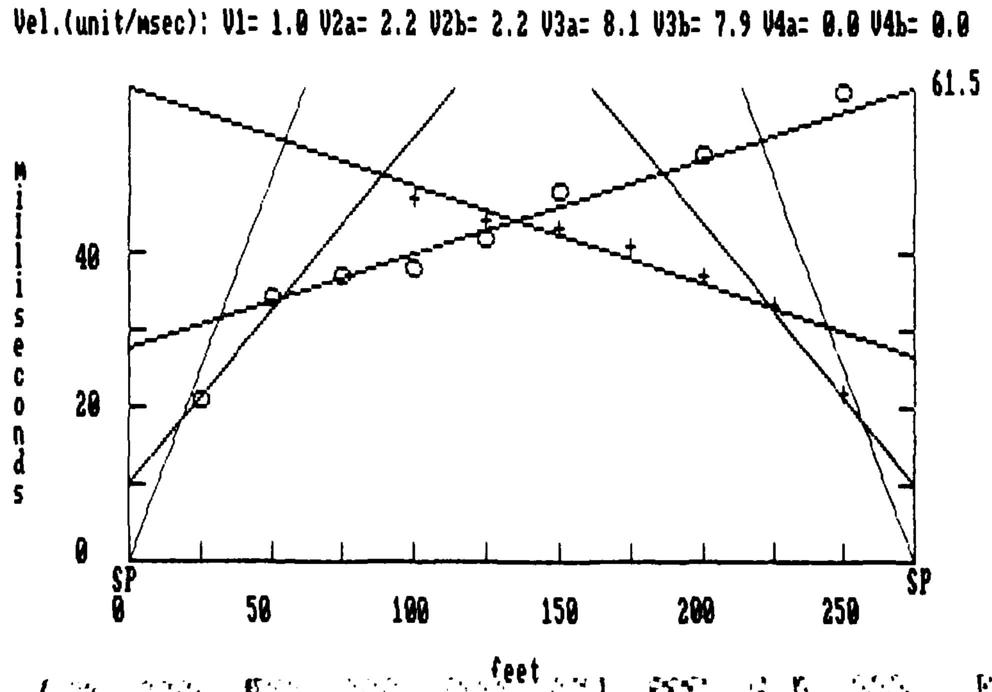
V1 = 1.0 V2 = 2.0 V3 = 6.5 V4 = 12.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	283	0	58			222
25		21	56			
50		33	55			
75		38	54			
100		40	50			
125		43	47			
150	284	48	46	262		
175		51	42			
200		52	37			
225		55	33			
250			21			
265	283		11			226

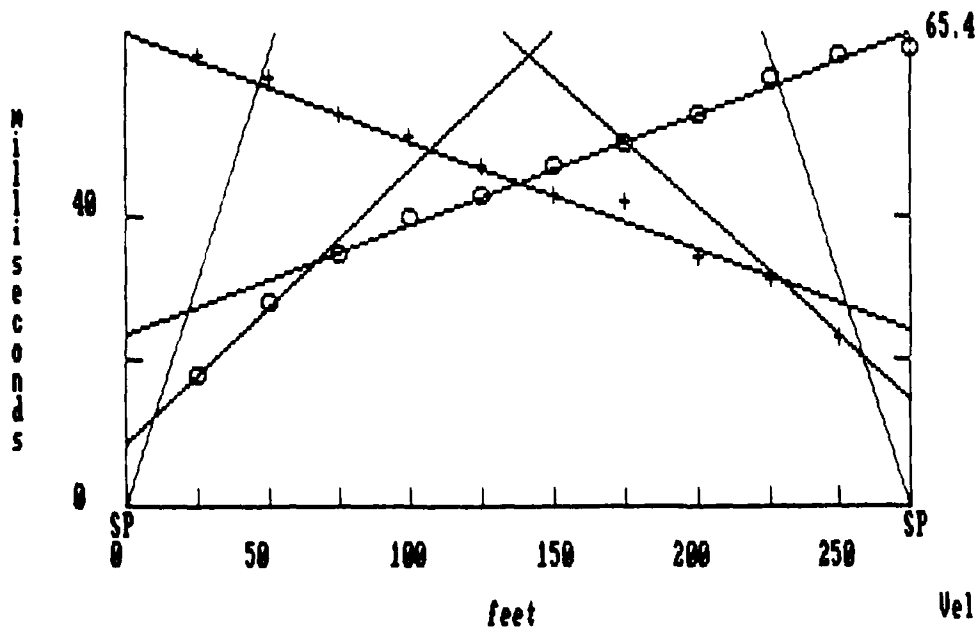
SPREAD 42

V1 = 1.0 V2 = 2.2 V3 = 8.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25		21				
50		34				
75		37				
100	282	38	47	263		
125	282	42	44	261		
150	283	48	43	256		
175			41			
200	282	53	37	257		
225			33			
250		61	21.5			
275		64	0			



Vel.(unit/msec): V1= 0.8 V2a= 2.6 V2b= 2.8 V3a= 6.6 V3b= 6.7 V4a= 0.0 V4b= 0.0

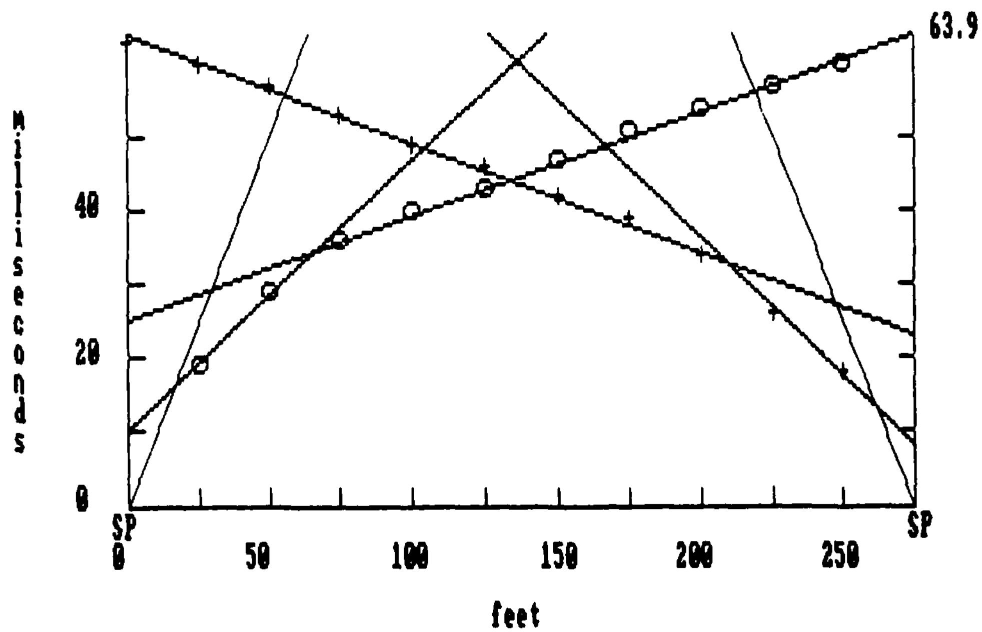


SPREAD 43

V1 = 0.8 V2 = 2.7 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	67			
25		18	62			
50		28	59			
75	281	35	54	260		
100	281	40	51	256		
125	281	43	47	258		
150	281	47	43	258		
175	280	50	42	254		
200	280	54	34.5	259		
225	279	59	31	256		
250		62	23			
275		63	0			

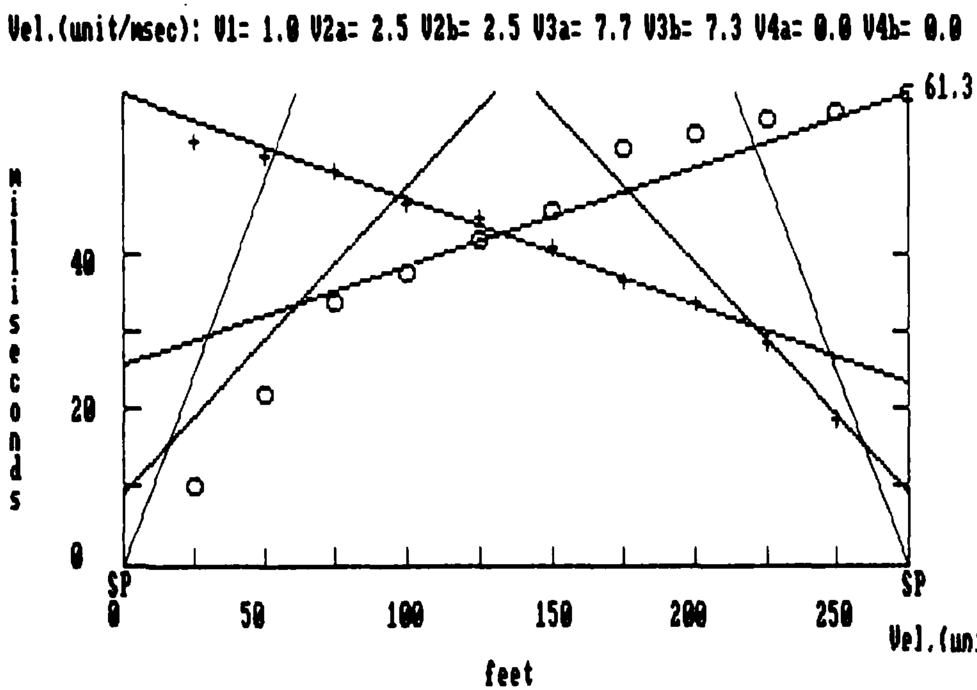
Vel.(unit/msec): V1= 1.0 V2a= 2.7 V2b= 2.7 V3a= 7.1 V3b= 6.8 V4a= 0.0 V4b= 0.0



SPREAD 44

V1 = 1.0 V2 = 2.7 V3 = 7.0

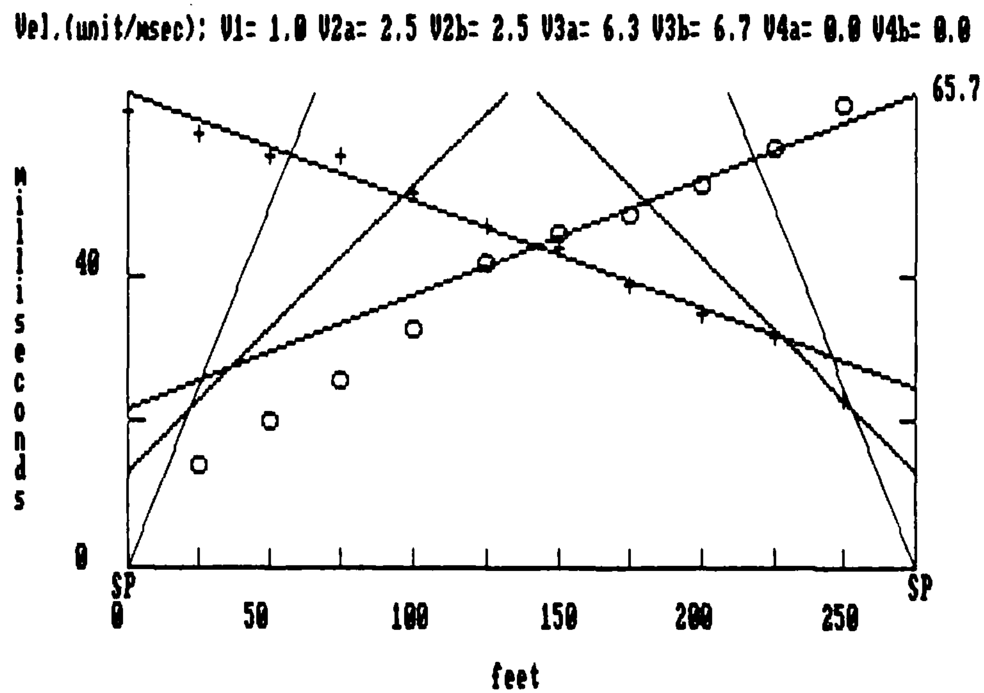
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	63			
25		19	60			
50		29	57			
75	273	36	53	246		
100	273	40	49	246		
125	274	43	46	247		
150	273	47	42	246		
175	273	51	39	245		
200	273	54	34	248		
225		57	26			
250		60	18			
275			0			



SPREAD 45

V1 = 1.0 V2 = 2.5 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		10	55			
50		22	53			
75		34	51			
100	268	38	47	245		
125	268	42	45	242		
150	268	46	41	243		
175	269	54	37	238		
200	268	56	34	238		
225		58	29			
250		59	19			
275		61	0			

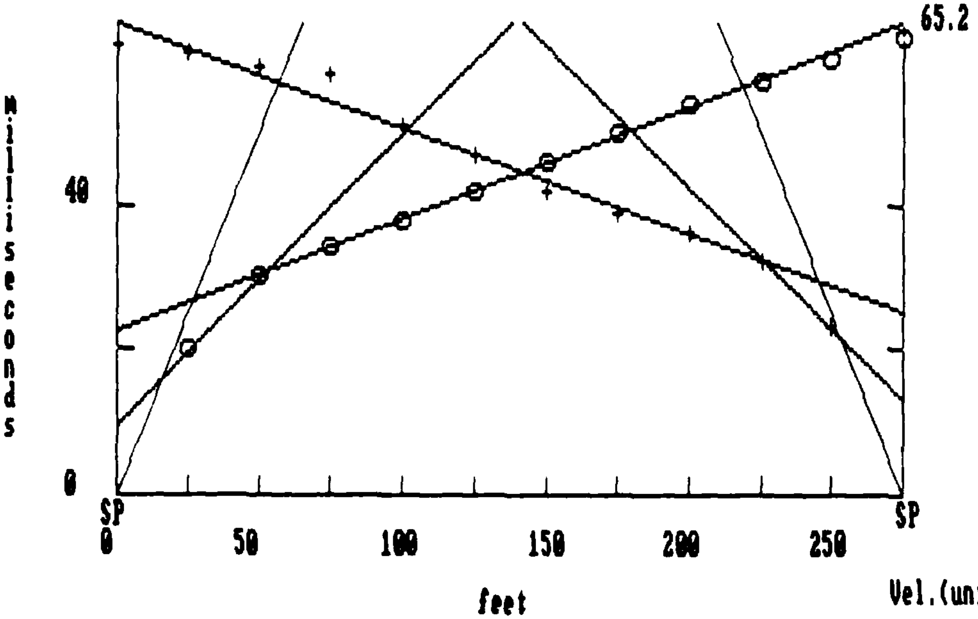


SPREAD 46

V1 = 1.0 V2 = 2.5 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	63			
25		14	60			
50		20	57			
75		26	57			
100		33	52			
125	268	42	47	249		
150	269	46	44	247		
175	269	49	39	250		
200	269	53	35	251		
225	270	58	32	249		
250		64	23			
275		66	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.5 V2b= 2.5 V3a= 6.4 V3b= 6.8 V4a= 0.0 V4b= 0.0

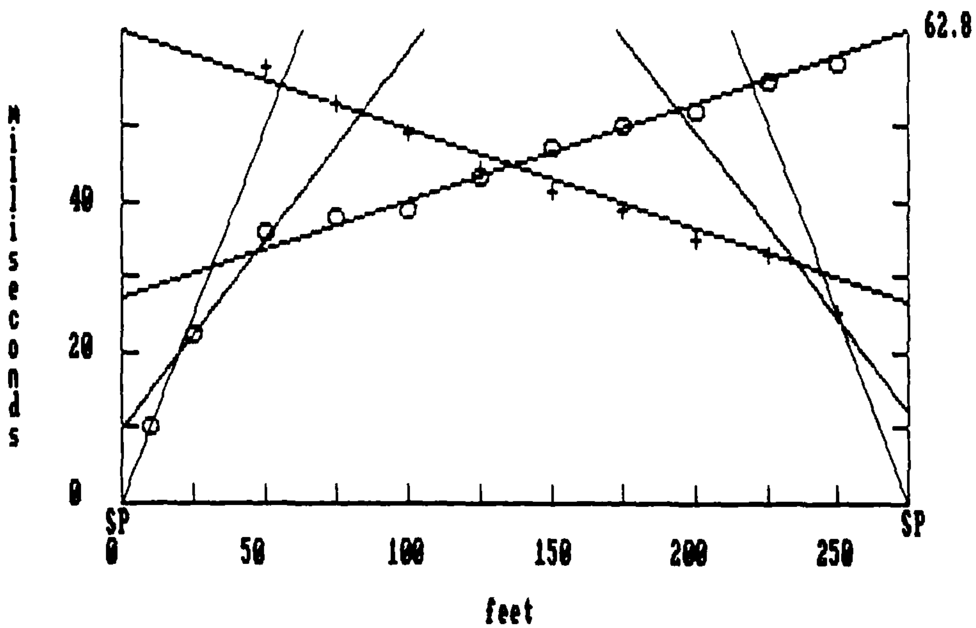


SPREAD 47

V1 = 1.0 V2 = 2.5 V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		20	61			
50	272	30	59	250		
75	273	34	58	247		
100	273	38	51	251		
125	273	42	47	251		
150	274	46	42	253		
175	275	50	39	253		
200	278	54	36	255		
225	276	57	32	254		
250		60	23			
275		63	0			

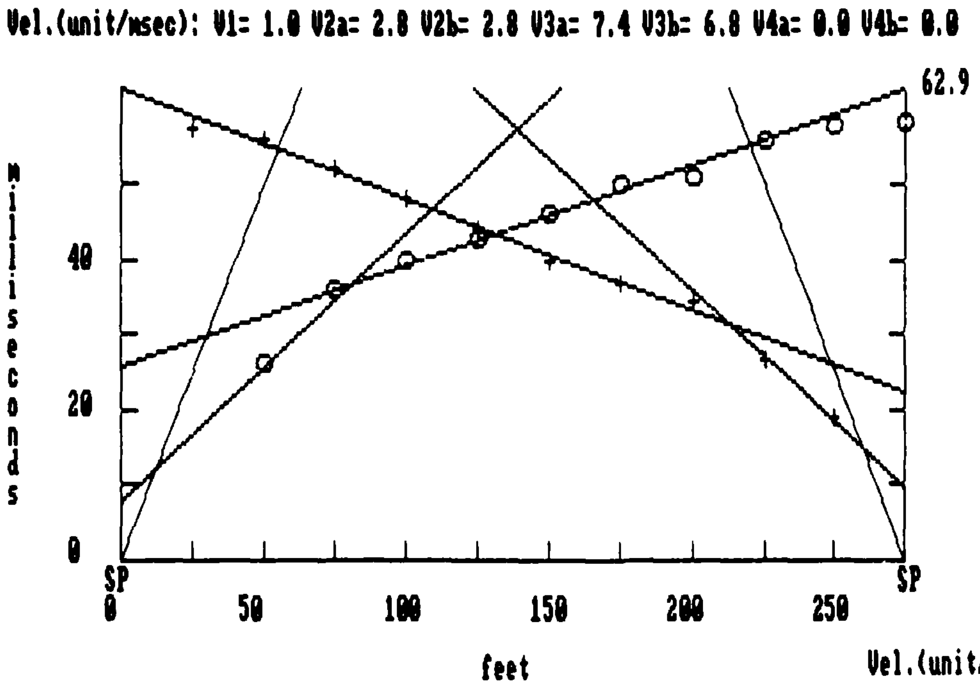
Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 7.7 V3b= 7.6 V4a= 0.0 V4b= 0.0



SPREAD 48

V1 = 1.0 V2 = 2.0 V3 = 7.5

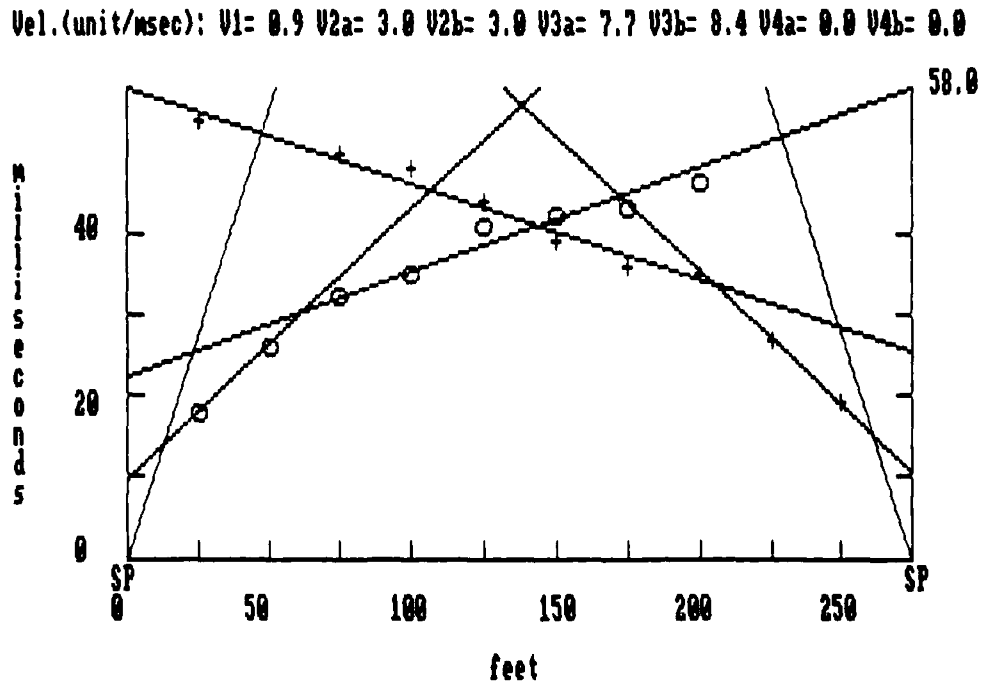
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
10		10				
25		22				
50	278	36	58	252		
75	277	38	53	254		
100	276	39	49	256		
125	276	43	44	257		
150	276	47	41	256		
175	276	50	39	255		
200	276	52	35	257		
225	276	56	33	255		
250		58.5	25			
275			0			



SPREAD 49

V1 = 1.0 V2 = 2.8 V3 = 7.0

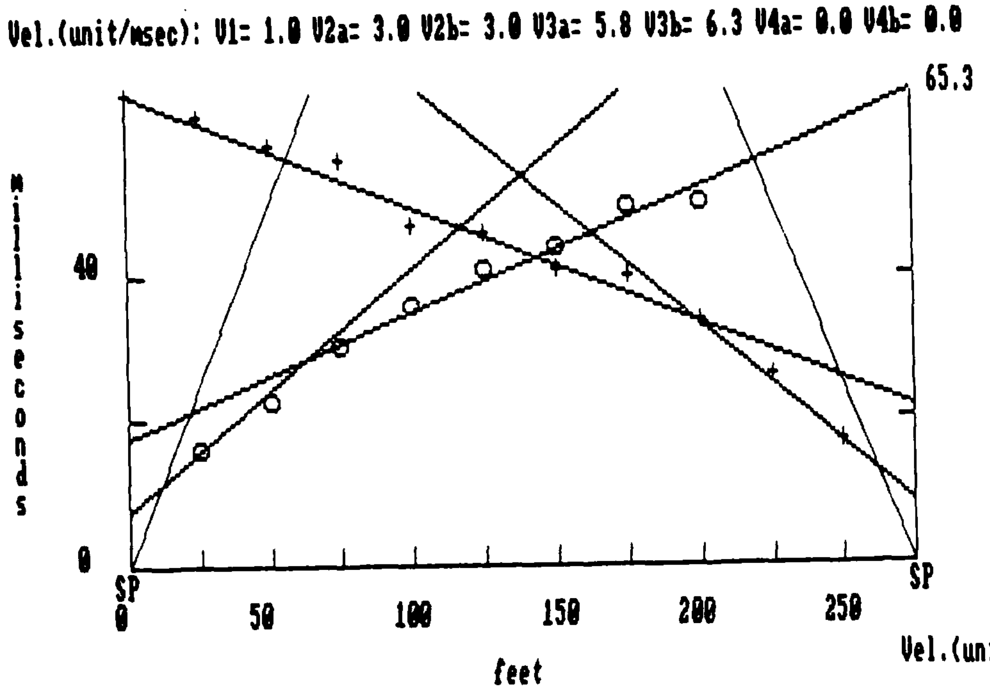
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25			57.5			
50		26	56			
75	277	36	52	248		
100	276	40	48	247		
125	275	43	44	248		
150	276	46	40	250		
175	277	50	37	249		
200	276	51	34.5	251		
225		56	26.5			
250		58	19			
275		58.5	0			



SPREAD 50

V1 = 0.9 V2 = 3.0 V3 = 8.0

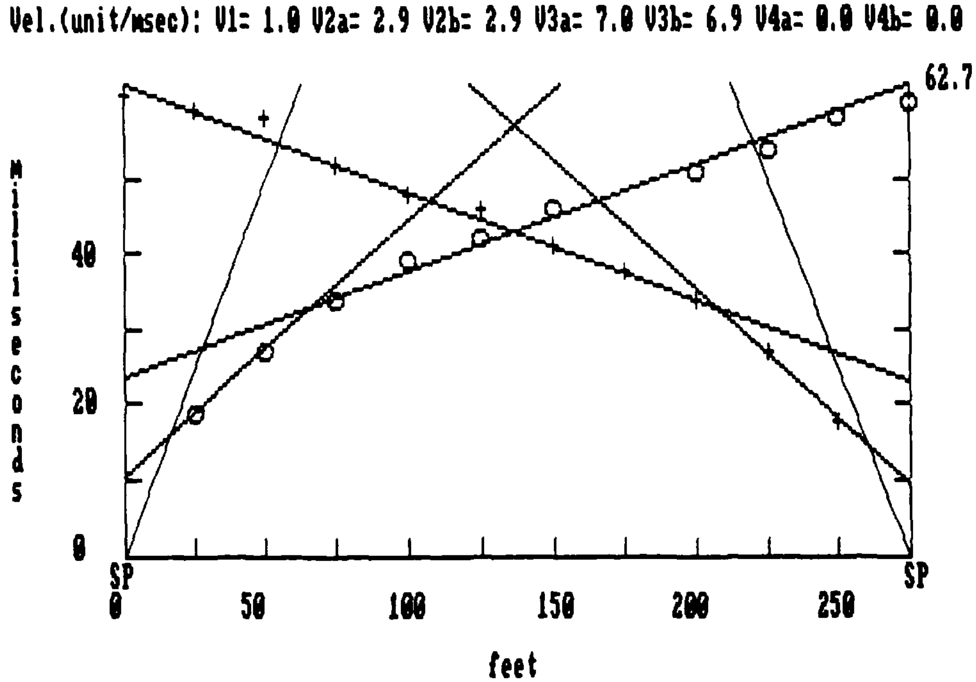
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0				
25		18	54			
50		26				
75	277	32	50	251		
100	277	35	48	249		
125	277	41	44	247		
150	279	42	39	255		
175	279	43	36	259		
200	280	46	35	255		
225		58	27			
250			19			
275			0			



SPREAD 51

V1 = 1.0 V2 = 3.0 V3 = 6.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	65			
25		16	62			
50		22.5	58			
75	274	30	56	248		
100	273	36	47	252		
125	274	41	46	246		
150	274	44	41	249		
175	273	49.5	40	241		
200	273	50	34	251		
225			26			
250			17			
275			0			

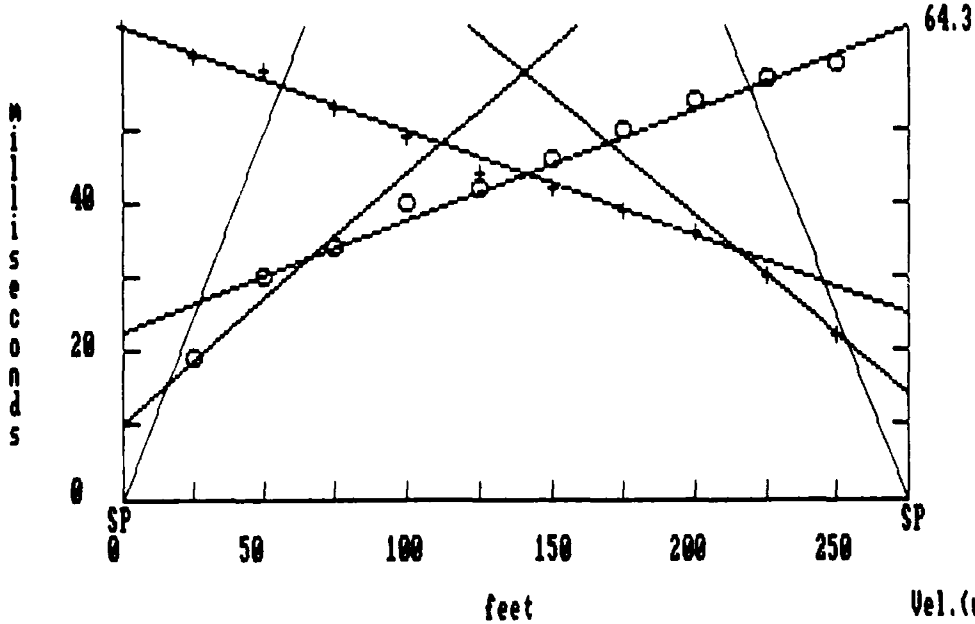


SPREAD 52

V1 = 1.0 V2 = 2.9 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	61			
25		19	59			
50		27	58			
75	276	34	52	250		
100	277	39	48	249		
125	277	42	46	248		
150	276	46	41	249		
175			38			
200	276	51	34	251		
225		54	27			
250		58	18			
275		60	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.9 V2b= 3.1 V3a= 6.6 V3b= 7.0 V4a= 0.0 V4b= 0.0

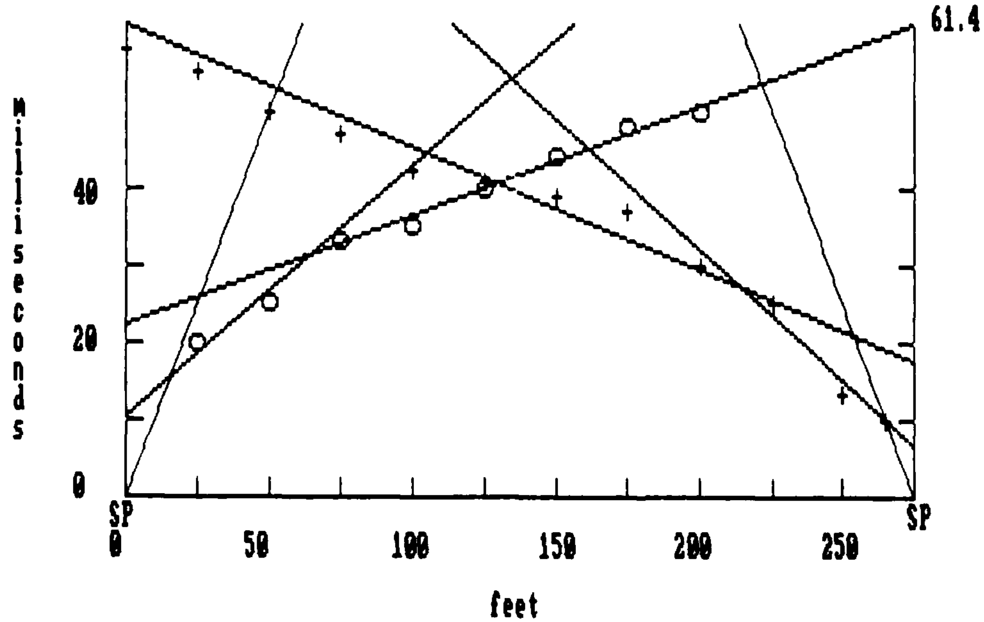


SPREAD 53

V1 = 1.0 V2 = 3.0 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	64			
25		19	60			
50	276	30	58	251		
75	276	34	53	254		
100	277	40	49	251		
125	278	42	44	256		
150	278	46	42	253		
175	278	50	39	252		
200	277	54	36	249		
225		57	30			
250		59	22			
275			0			

Vel.(unit/msec): V1= 1.0 V2a= 3.1 V2b= 2.9 V3a= 7.0 V3b= 6.2 V4a= 0.0 V4b= 0.0

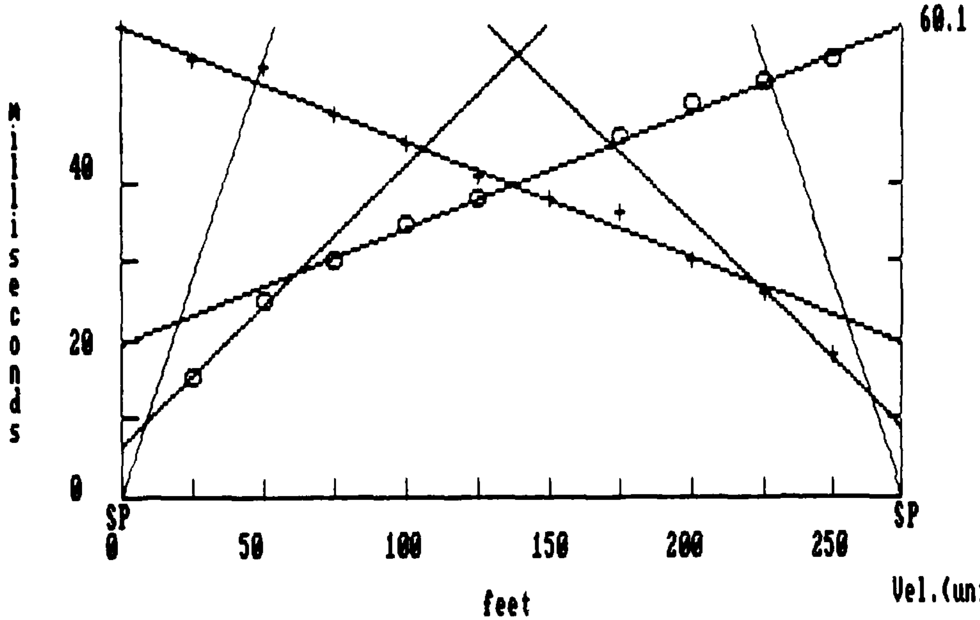


SPREAD 54

V1 = 1.0 V2 = 3.0 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	58			
25		20	55			
50		25	50			
75	273	33	47	252		
100	272	35	42	257		
125	272	40	41	250		
150	271	44	39	245		
175	271	48	37	241		
200	269	50	30	248		
225			25			
250			13			
265			10			

Vel.(unit/msec): V1= 0.9 V2a= 2.8 V2b= 2.8 V3a= 6.7 V3b= 6.8 V4a= 0.0 V4b= 0.0

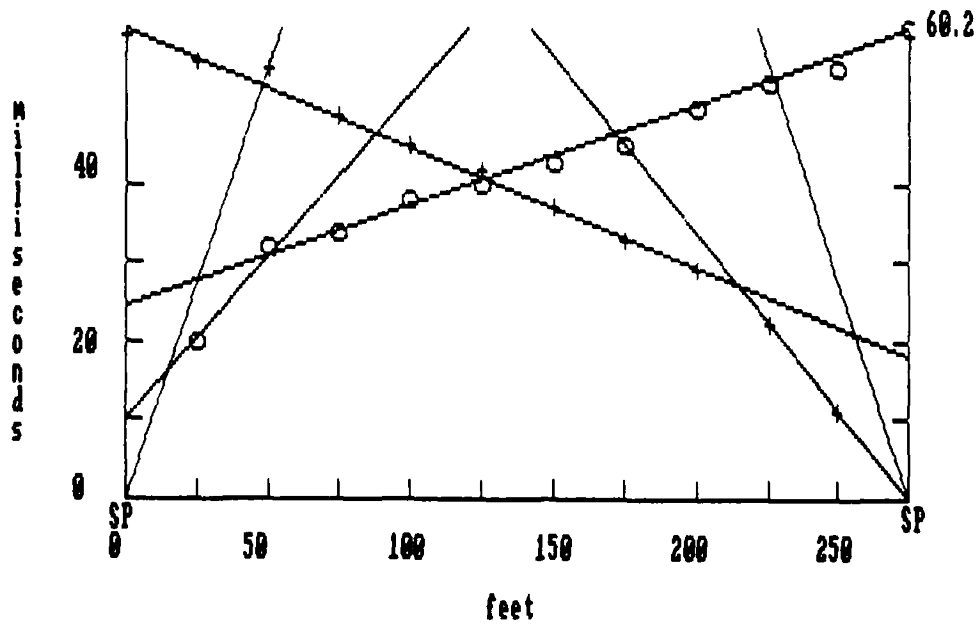


SPREAD 55

V1 = 0.9 V2 = 2.8 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	60			
25		15	56			
50		25	55			
75	273	30	49	252		
100	273	35	45	251		
125	273	38	41	252		
150			38			
175	271	46	36	245		
200	271	50	30	249		
225		53	26			
250		56	18			
275		61	0			

Vel.(unit/msec): V1= 0.9 V2a= 2.4 V2b= 2.2 V3a= 7.8 V3b= 6.6 V4a= 0.0 V4b= 0.0

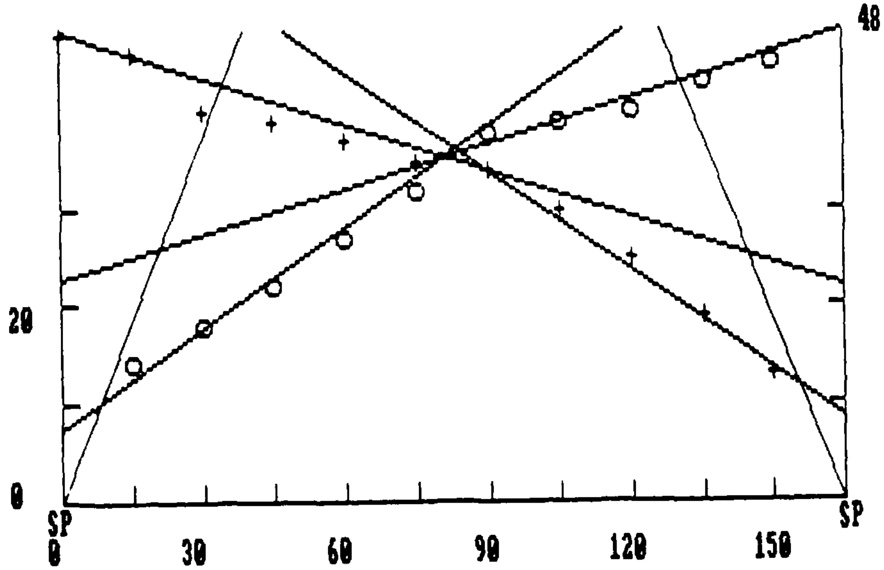


SPREAD 56

V1 = 0.9 V2 = 2.3 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	59			
25		20	56			
50	271	32	55	242		
75	271	34	49	247		
100	270	38	45	247		
125	270	40	42	247		
150	269	43	37	250		
175	269	45	33	252		
200	269	50	29	251		
225		53	22			
250		55	11			
275		60	0			

Vel.(unit/msec): V1= 0.8 V2a= 2.9 V2b= 2.9 V3a= 6.4 V3b= 6.3 V4a= 0.0 V4b= 0.0

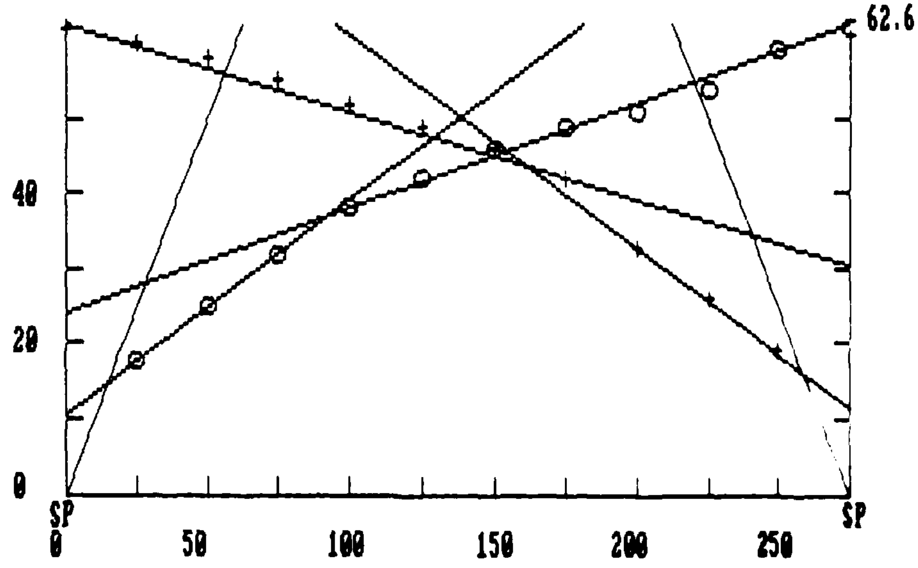


SPREAD 57

V1 = 0.8 V2 = 2.9 V3 = 6.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	48			
15		14	46			
30		18	40			
45		22	39			
60		27	37			
75		32	35			
90	271	38	34			245
105		39	30			
120		40	25			
135		43	19			
150		45	13			
165		50	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.5 V2b= 3.5 V3a= 7.1 V3b= 8.5 V4a= 0.0 V4b= 0.0

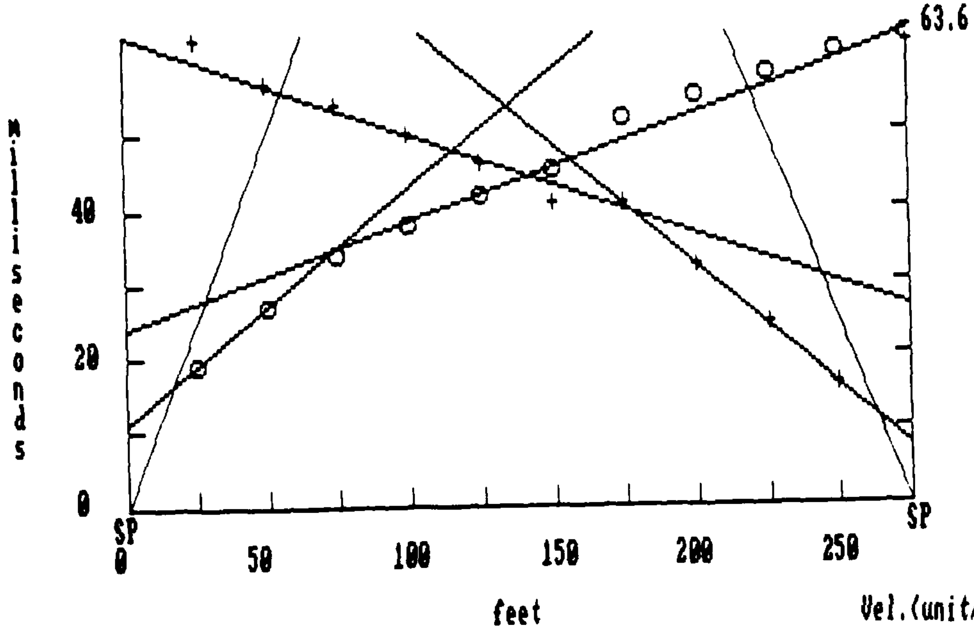


SPREAD 58

V1 = 1.0 V2 = 3.5 V3 = 7.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		18	60			
50		25	58			
75		32	55			
100	274	38	52			238
125	275	42	49			236
150	275	46	46			234
175		49	42			
200		51	33			
225		54	26			
250		59	19			
275		63	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.2 V2b= 3.0 V3a= 7.0 V3b= 7.4 V4a= 0.0 V4b= 0.0

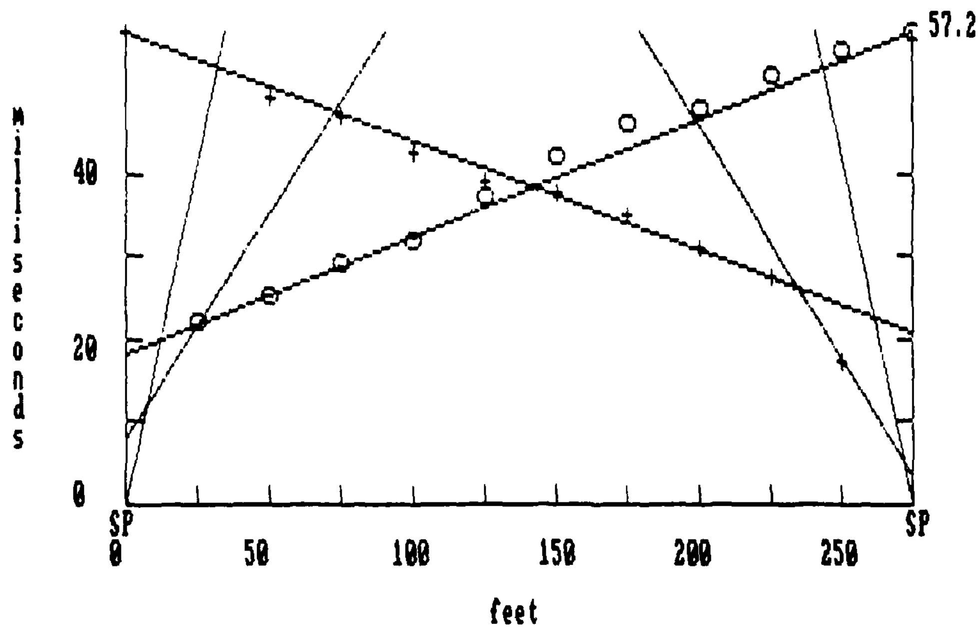


SPREAD 59

V1 = 1.0 V2 = 3.1 V3 = 7.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	64			
25		19	63			
50		27	57			
75	270	34	54			240
100	270	38	50			240
125	270	42	46			240
150	270	45	41			244
175	270	52	41			232
200		55	32.5			
225		58	24.5			
250		61	16			
275		63	0			

Vel.(unit/msec): V1= 0.6 V2a= 1.8 V2b= 1.8 V3a= 7.0 V3b= 7.5 V4a= 0.0 V4b= 0.0

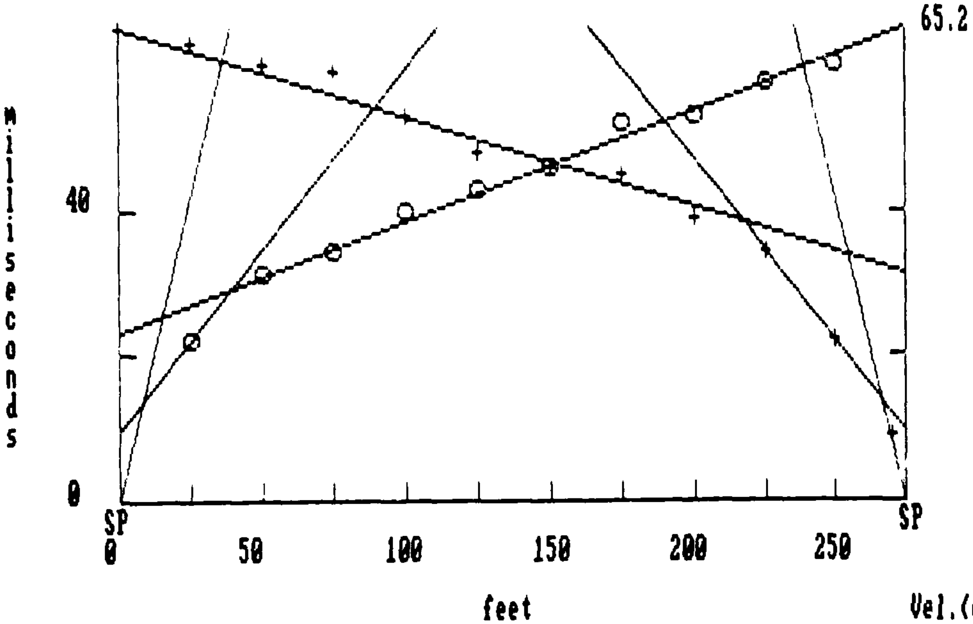


SPREAD 60

V1 = 0.6 V2 = 1.8 V3 = 7.4

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	57			
25	262	22	58	245		
50	262	25	49	250		
75	262	29	47	249		
100	262	32	42.5	250		
125	262	37	39	249		
150	262	42	37.5	245		
175	262	46	35	244		
200	262	48	31	246		
225	262	52	27.5	245		
250		55	17			
275		57	0			

Vel.(unit/msec): V1= 0.6 V2a= 2.0 V2b= 2.0 V3a= 6.5 V3b= 8.1 V4a= 0.0 V4b= 0.0

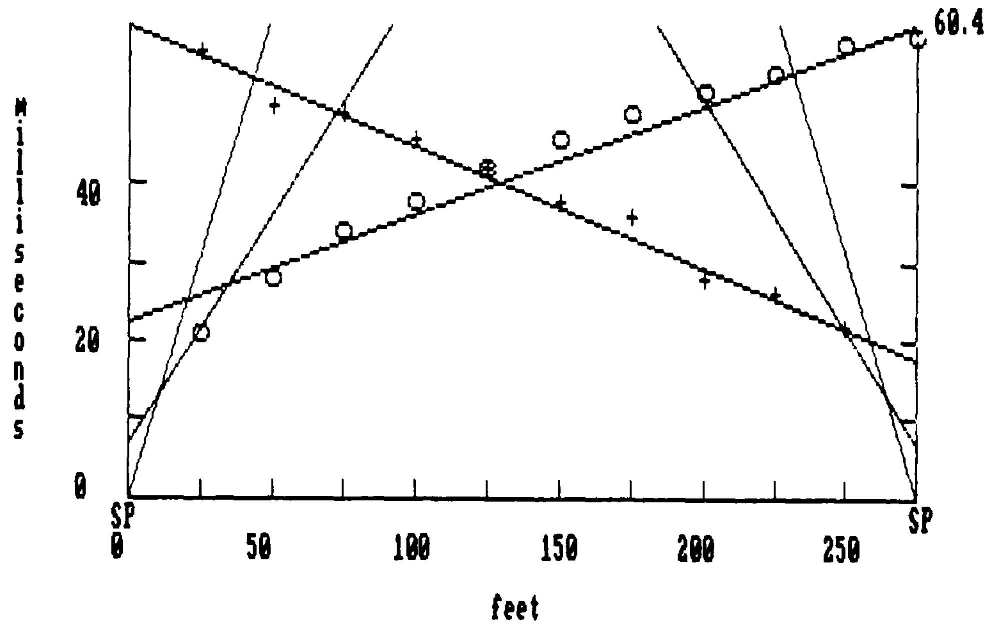


SPREAD 61

V1 = 0.6   V2 = 2.0   V3 = 7.2

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	65			
25		22	63			
50	275	31	60	256		
75	275	34	59	253		
100	274	40	53	252		
125	274	43	48	254		
150	273	46	46	253		
175	273	52	45	247		
200	272	53	39	252		
225		57.5	34			
250		60	22			
270			9			

Vel.(unit/msec): V1= 0.8 V2a= 1.7 V2b= 1.7 V3a= 7.2 V3b= 6.4 V4a= 0.0 V4b= 0.0

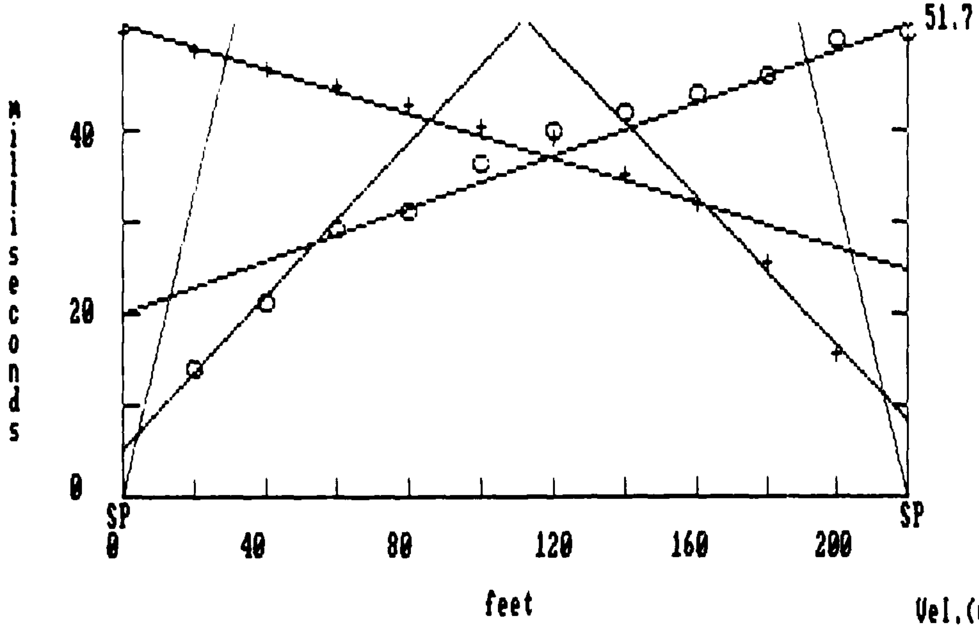


SPREAD 62

V1 = 0.8   V2 = 1.7   V3 = 6.8

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	61			
25		21	57			
50	272	28	50	260		
75	270	34	49	253		
100	269	38	46	252		
125	268	42	42	251		
150	268	46	38	250		
175	266	49	36	248		
200	266	52	28	252		
225	266	54	26	252		
250	266	58	22	252		
275		59	0			

Vel.(unit/msec): V1= 0.6 V2a= 2.4 V2b= 2.4 V3a= 6.9 V3b= 8.2 V4a= 0.0 V4b= 0.0

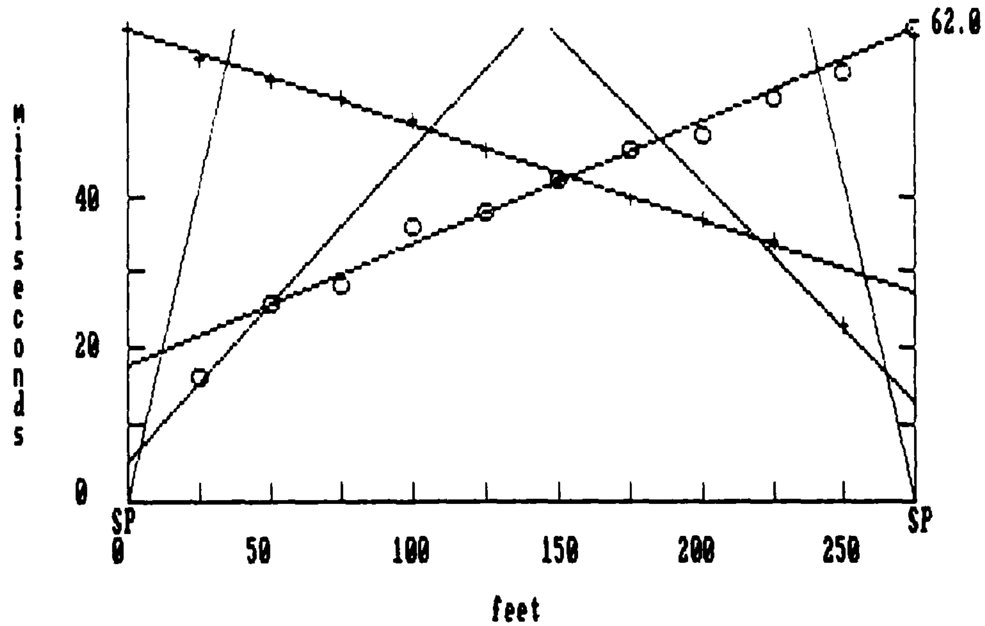


SPREAD 63

V1 = 0.6 V2 = 2.4 V3 = 7.4

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	51			
20		14	49			
40		21	47			
60	272	29	45			250
80	273	31	43			251
100	273	36.5	40.5			248
120	275	40	39			246
140	274	42	35			249
160	275	44	32			250
180		46	25.5			
200		50	15.5			
220		51	0			

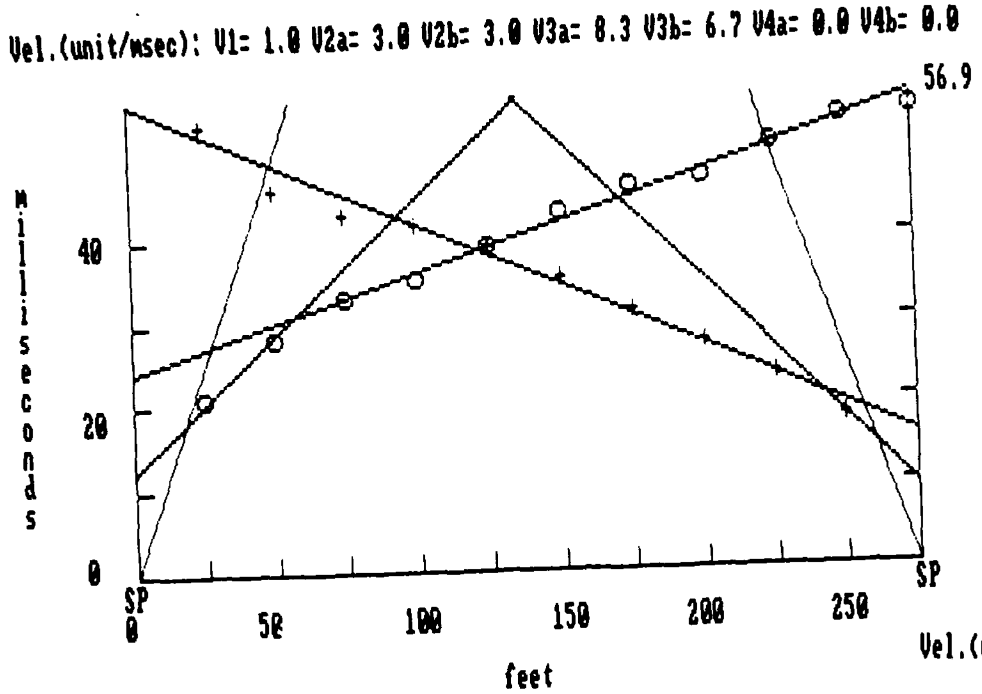
Vel.(unit/msec): V1= 0.6 V2a= 2.4 V2b= 2.6 V3a= 6.2 V3b= 7.9 V4a= 0.0 V4b= 0.0



SPREAD 64

V1 = 0.6 V2 = 2.5 V3 = 6.8

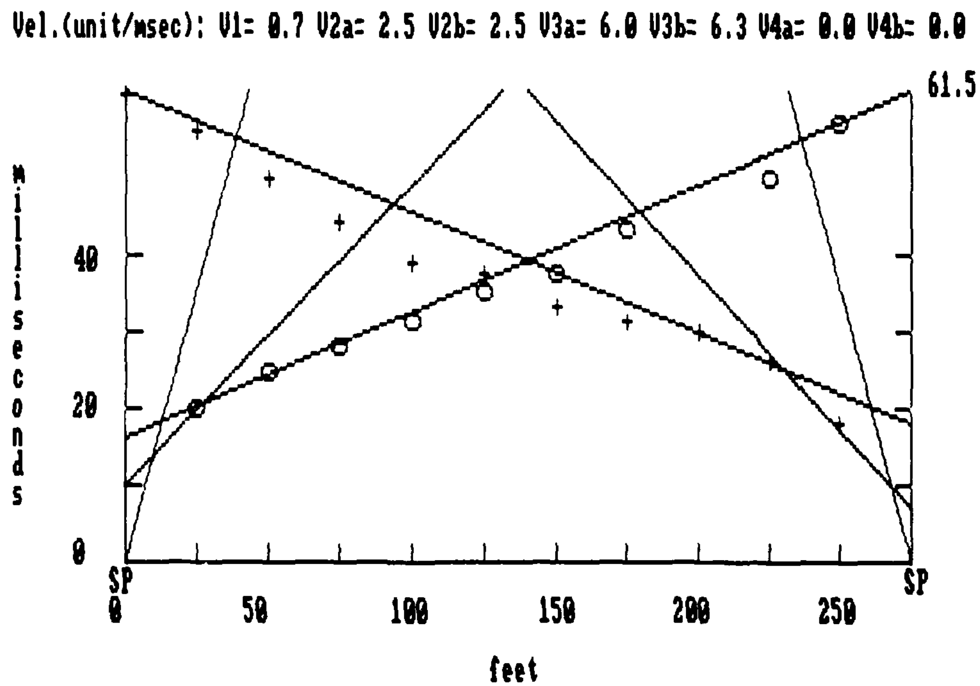
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		16	58			
50	269	26	55			254
75	269	28	53			254
100	268	36	50			246
125	269	38	46			249
150	269	42	42			250
175	269	46	40			247
200	269	48	37			248
225	269	53	34			246
250		56	23			
275		62	0			



SPREAD 65

V1 = 1.0 V2 = 3.0 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	57			
25		21	54			
50		28	46			
75	269	33	43	251		
100	267	35	42	248		
125	269	39	39	248		
150	267	43	35	246		
175	267	46	31	247		
200	266	47	27	252		
225	266	51	23	251		
250		54	18			
275		55	0			

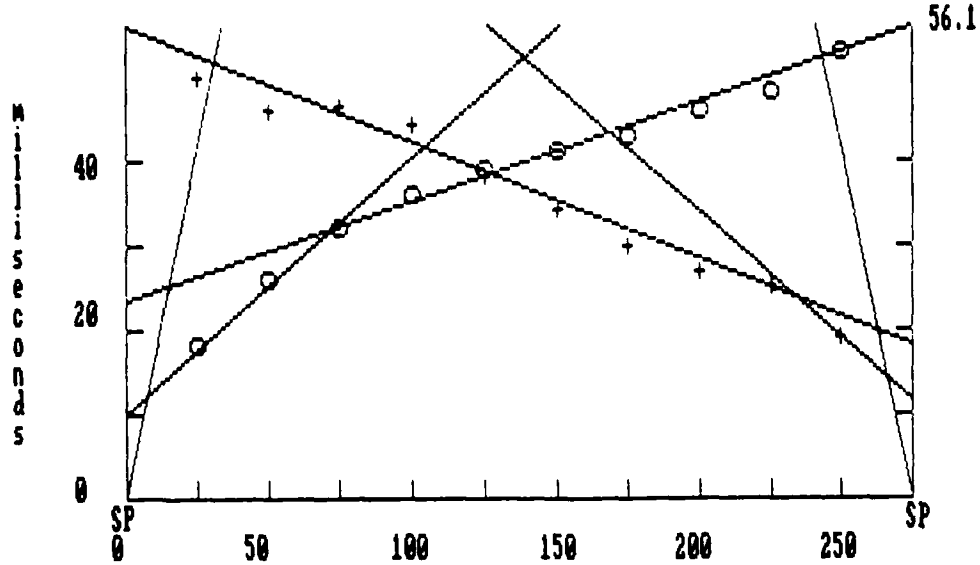


SPREAD 66

V1 = 0.7 V2 = 2.5 V3 = 6.2

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	61			
25		20	56			
50	268	24.5	50	258		
75	267	28	44	261		
100	266	31.5	39	263		
125	266	35	37.5	260		
150	266	37.5	33	262		
175	265	43	31.5	256		
200			30			
225	265	50	26	254		
250		57	18			
275		61.5	0			

Vel.(unit/msec): V1= 0.6 V2a= 3.3 V2b= 3.3 V3a= 8.3 V3b= 7.2 V4a= 0.0 V4b= 0.0

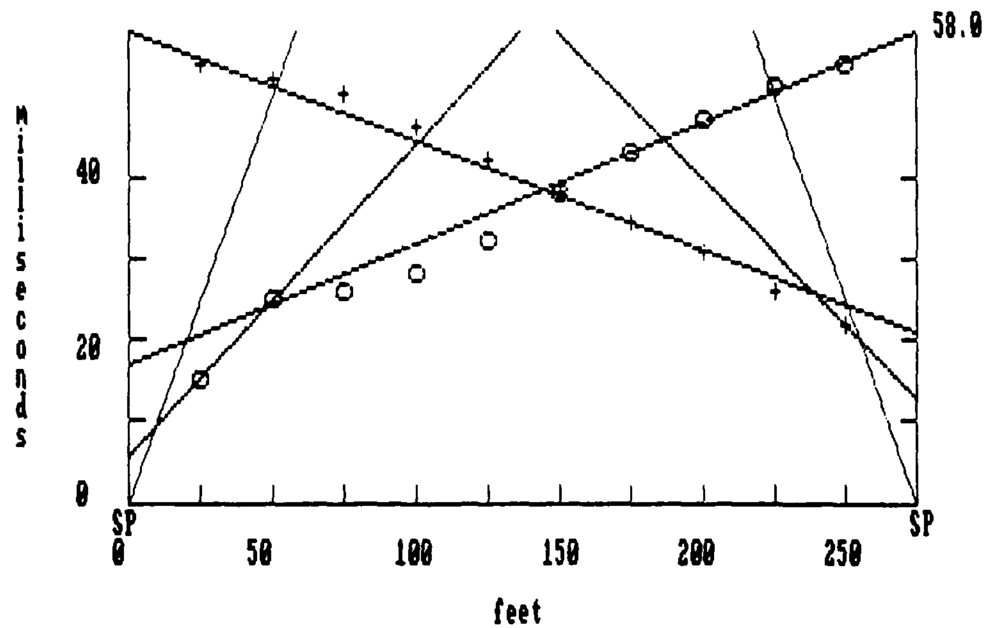


SPREAD 67

V1 = 0.6 V2 = 3.3 V3 = 7.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	56			
25		18	50			
50		26	46			
75	276	32	46	252		
100	277	36	44	249		
125	275	39	38	252		
150	273	41	34	253		
175	270	43	30	254		
200	269	46	27	254		
225	269	48	25	254		
250		53	19			
275		56	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.6 V2b= 2.8 V3a= 6.7 V3b= 7.4 V4a= 0.0 V4b= 0.0

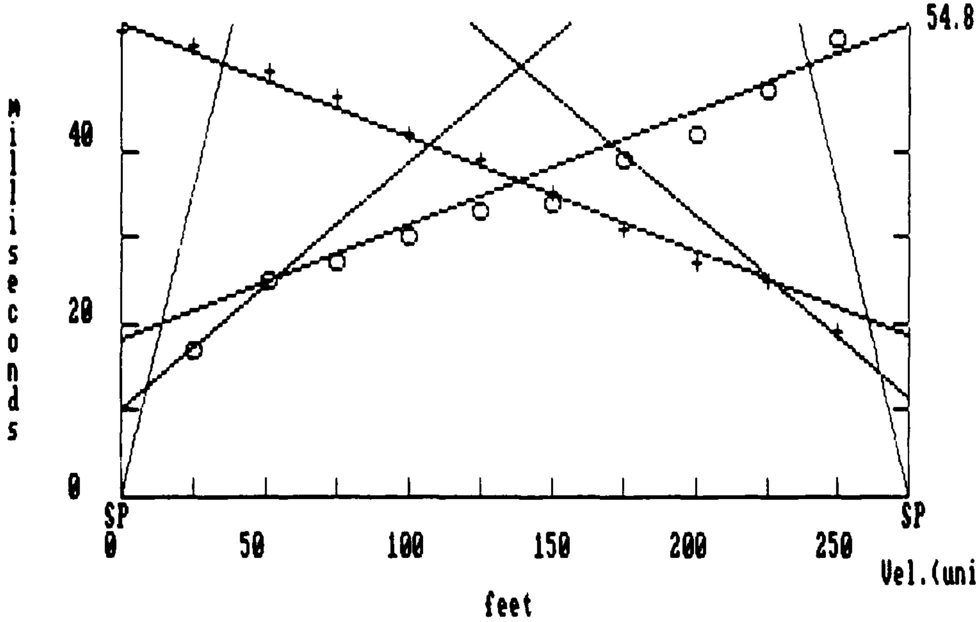


SPREAD 68

V1 = 1.0 V2 = 2.7 V3 = 6.8

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	58			
25		15	54			
50	280	25	52	262		
75	280	26	50	263		
100	280	28	46	266		
125	279	32	42	265		
150	279	38	38	262		
175	278	43	34.5	259		
200	278	47	31	258		
225	277	51	26	259		
250		54	22			
275		58	0			

Vel.(unit/msec): V1= 0.7 V2a= 3.5 V2b= 3.5 V3a= 7.5 V3b= 7.6 V4a= 0.0 V4b= 0.0

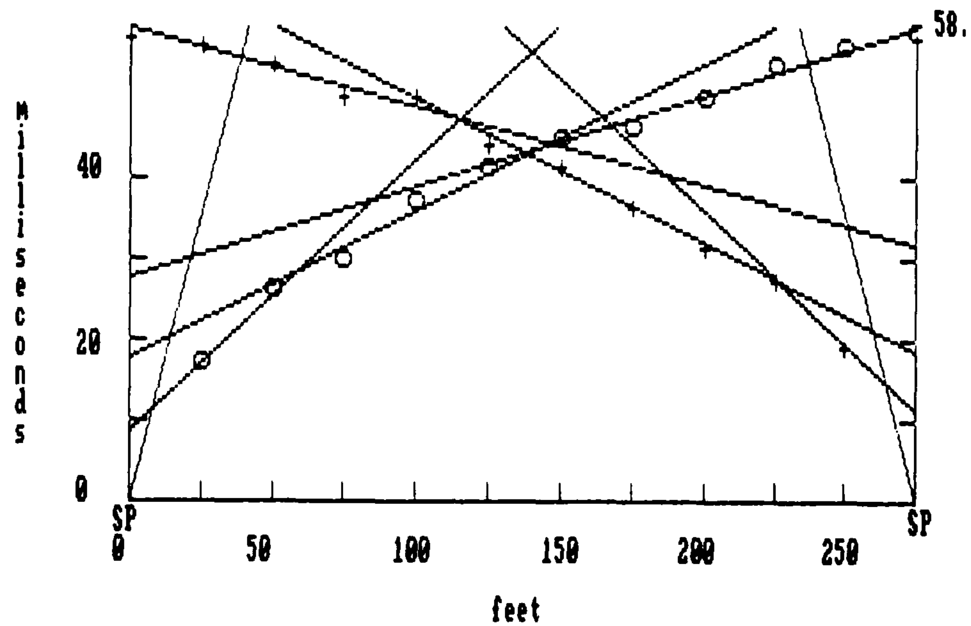


SPREAD 69

V1 = 0.7 V2 = 3.5 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	54			
25		17	52			
50	276	25	49	256		
75	275	27	46	258		
100	275	30	42	260		
125	276	33	39	260		
150	277	34	35	267		
175	277	39	31	266		
200	277	42	27	268		
225	277	47	25	262		
250		53	19			
275		55	0			

Vel.(unit/msec): V1= 0.7 V2a= 3.0 V2b= 3.0 V3a= 5.5 V3b= 5.6 V4a= 8.9 V4b=10.2

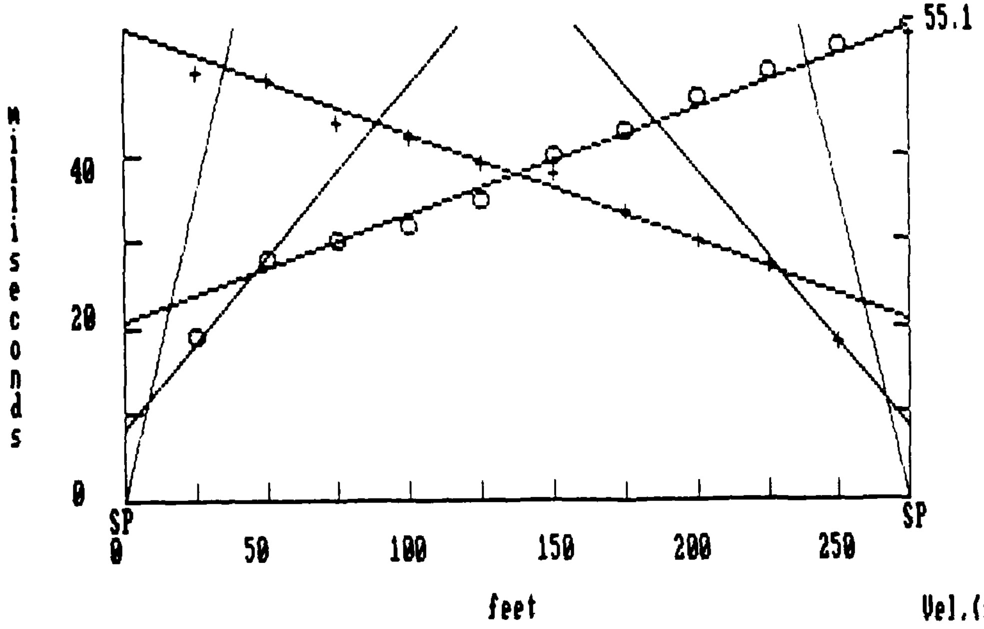


SPREAD 70

V1 = 0.7 V2 = 3.0 V3 = 5.5 V4 = 9.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	281	0	57			232
25		17	56			
50		26	54			
75		30	50			
100		37	50			
125	278	41	44	261		
150	277	45	41	259		
175		46	36			
200		50	31			
225		54	27			
250		56	19			
275	277	58	0			220

Vel.(unit/msec): V1= 0.7 V2a= 2.5 V2b= 2.5 V3a= 8.0 V3b= 8.0 V4a= 0.0 V4b= 0.0

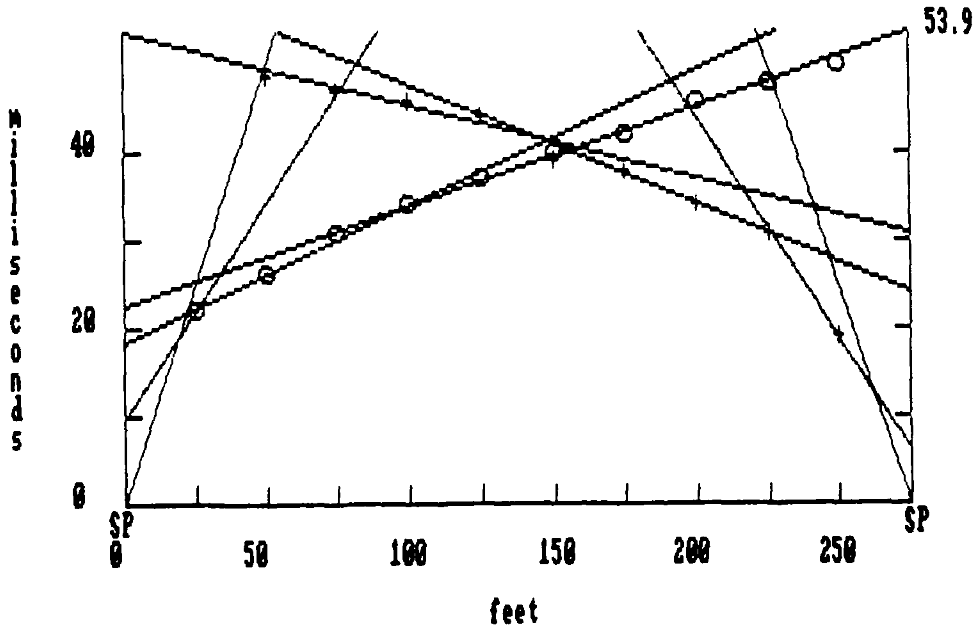


SPREAD 71

V1 = 0.7 V2 = 2.5 V3 = 8.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	56			
25		19	50			
50	280	28	49	260		
75	279	30	44	263		
100	279	32	42	263		
125	279	35	39	262		
150	279	40	38	257		
175	278	43	33.5	259		
200	278	47	30	257		
225	277	50	27	256		
250		53	18			
275		55	0			

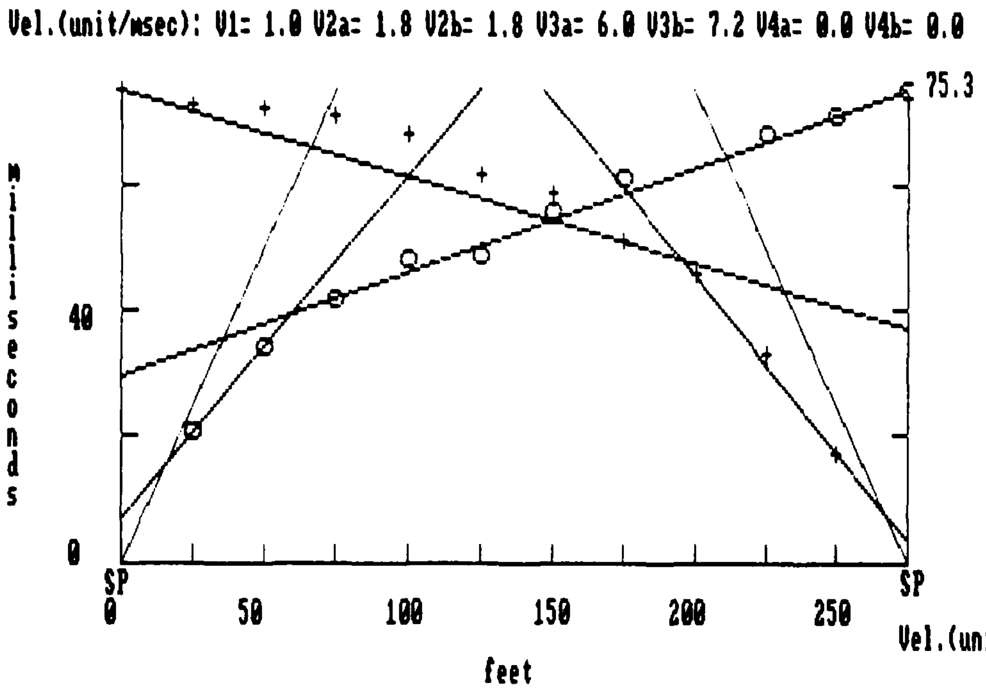
Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 6.4 V3b= 7.4 V4a= 8.7 V4b=11.9



SPREAD 72

V1 = 1.0 V2 = 2.0 V3 = 7.0 V4 = 10.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0	272	0	54	259	239	
25		22				
50		26	49			
75		31	47			
100		34	46			
125		37	44			
150		40	39			
175		42	38			
200		46	34			
225		48	31			
250		50	19			
275	272	54	0	250	220	



SPREAD 73

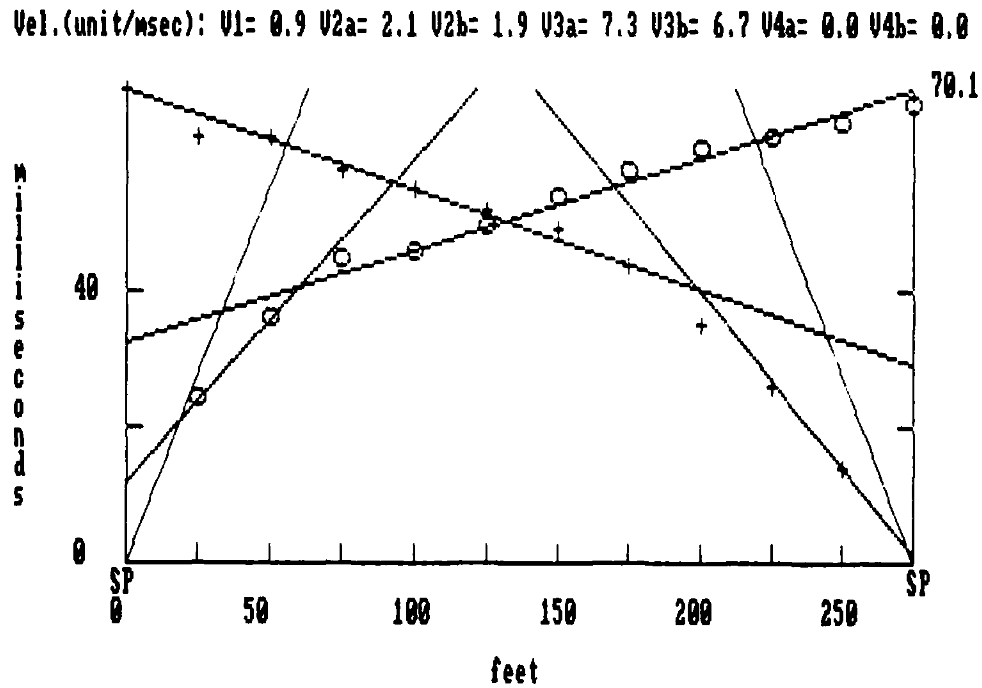
V1 = 1.0 V2 = 1.8 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	75			
25		21	73			
50		34	72			
75	290	42	71	257		
100	288	48	68	253		
125	287	49	62	257		
150	287	56	59	253		
175	287	61	51	255		
200			46			
225		68	33			
250		71	17			
275		75	0			

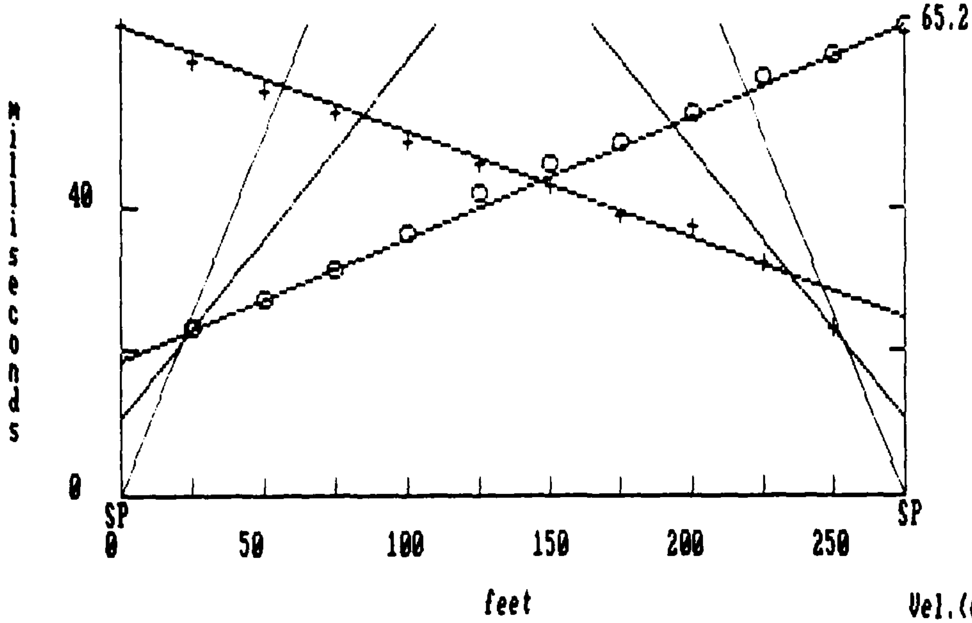
SPREAD 74

V1 = 0.9 V2 = 2.0 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	70			
25		24	63			
50		36	63			
75	288	45	58	258		
100	288	46	55	260		
125	289	50	52	259		
150	289	54	49	258		
175	288	58	44	259		
200		61	35			
225		63	26			
250		65	14			
275		68	0			



Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 5.9 V3b= 6.8 V4a= 0.0 V4b= 0.0

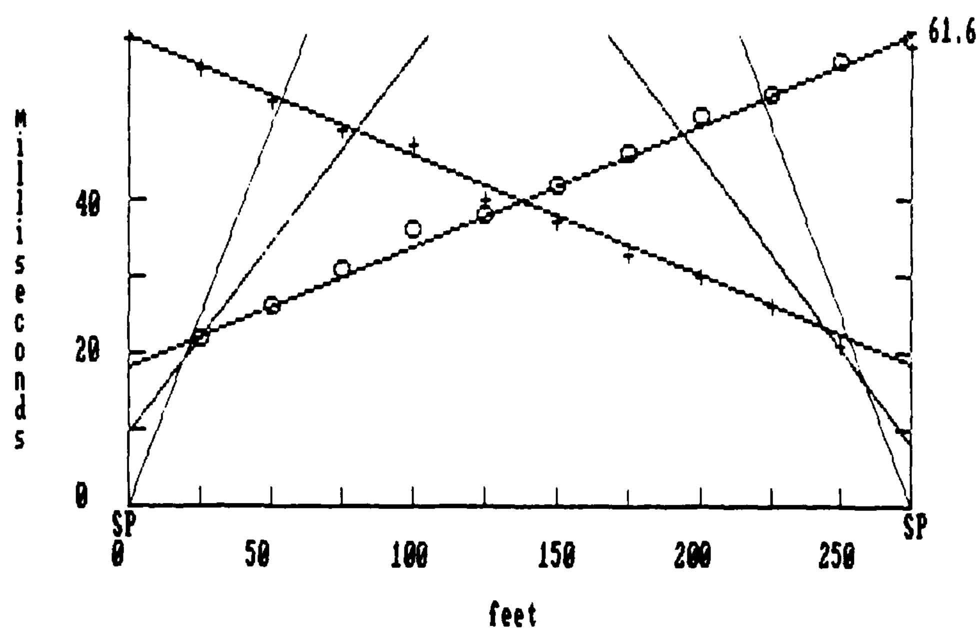


SPREAD 75

V1 = 1.0 V2 = 2.0 V3 = 6.3

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	65			
25	272	23	60	259		
50	272	27	56	260		
75	272	31	53	259		
100	271	36	49	257		
125	272	42	46	254		
150	273	46	43	254		
175	273	49	39	255		
200	274	53	37	254		
225	277	58	32	257		
250		61	23			
275		65	0			

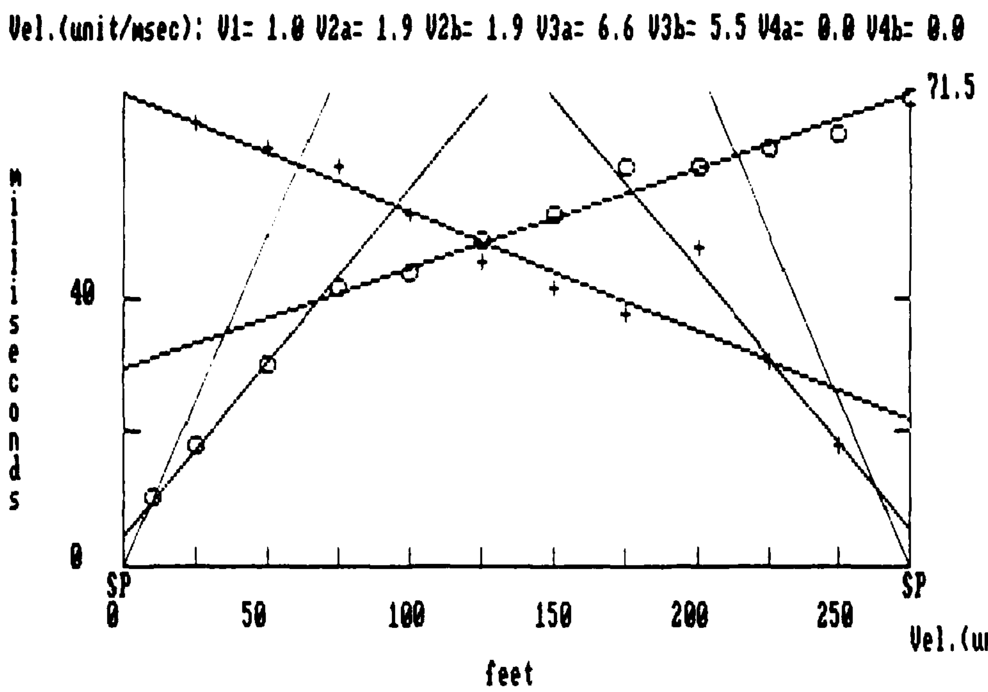
Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 6.3 V3b= 6.4 V4a= 0.0 V4b= 0.0



SPREAD 76

V1 = 1.0 V2 = 2.0 V3 = 6.4

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	61			
25	275	22	57	262		
50	275	26	53	262		
75	275	31	49	261		
100	274	36	47	257		
125	273	38	40	261		
150	272	42	37	259		
175	272	46	33	259		
200	272	51	30	257		
225	272	54	26	258		
250		58	21			
275		61	0			



SPREAD 77

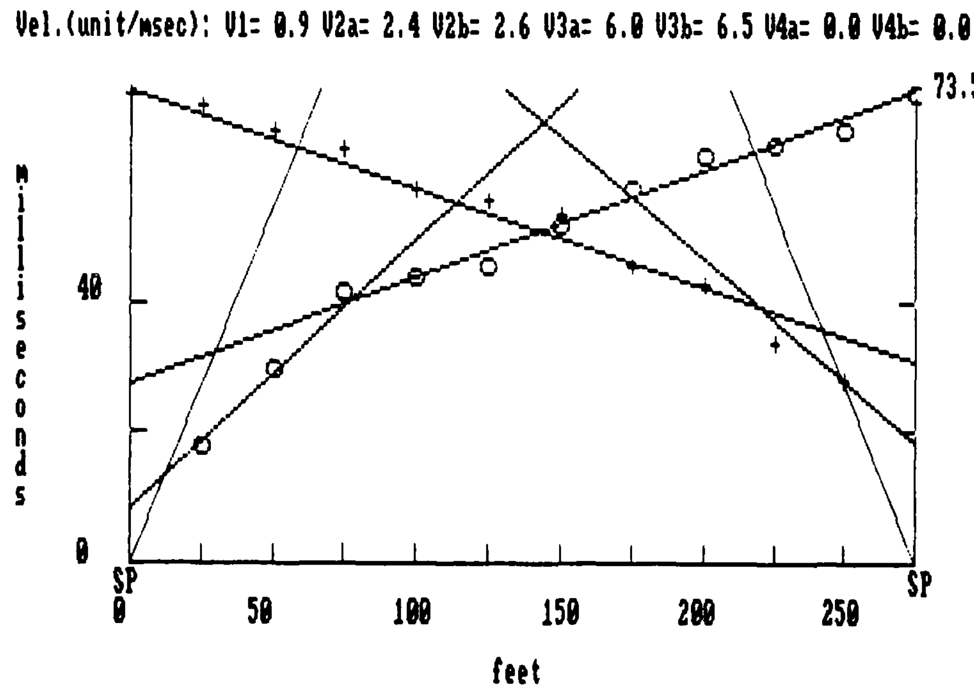
V1 = 1.0 V2 = 1.9 V3 = 6.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
10		10				
25		18	67			
50		30	63			
75	285	42	60	257		
100	285	44	53	262		
125	285	49	46	264		
150	284	53	42	264		
175	287	60	38	263		
200		60	48			
225		63	31			
250		65	18			
275		71	0			

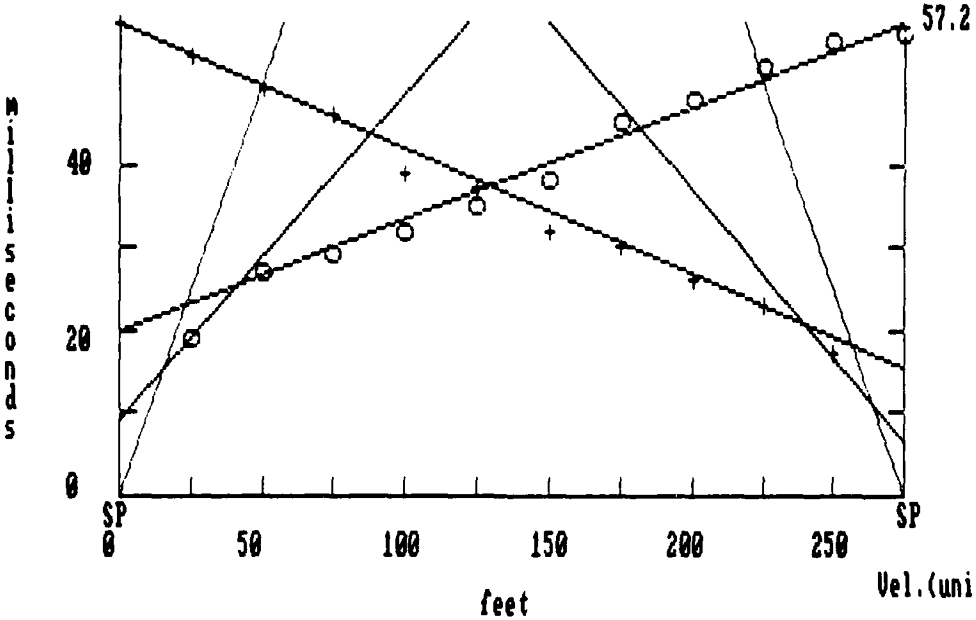
SPREAD 78

V1 = 0.9 V2 = 2.5 V3 = 6.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	73			
25		18	71			
50		30	67			
75	286	42	64	253		
100	287	44	58	260		
125	288	46	56	260		
150	288	52	54	256		
175	288	58	46	259		
200	289	63	43	256		
225		65	34			
250		67	28			
275		73	0			



Vel.(unit/msec): V1= 1.0 V2a= 2.5 V2b= 2.5 V3a= 7.3 V3b= 6.5 V4a= 0.0 V4b= 0.0

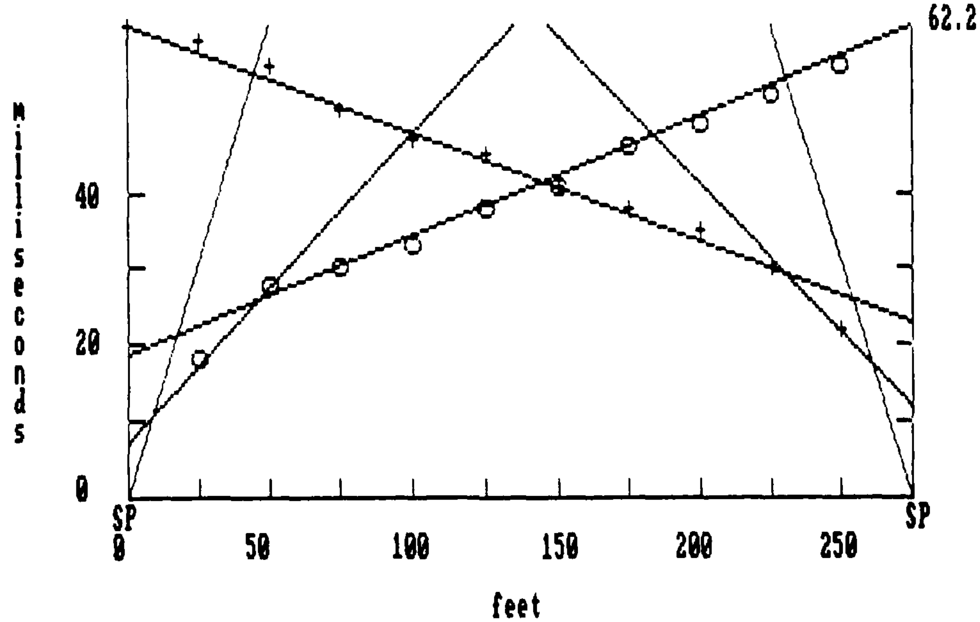


SPREAD 79

V1 = 1.0   V2 = 2.5   V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	57			
25		19	53			
50	278	27	49	260		
75	278	29	46	261		
100	277	32	39	265		
125	276	35	37	263		
150	276	38	32	265		
175	276	45	30	259		
200	276	48	26	260		
225	277	52	23	259		
250		55	17			
275		56	0			

Vel.(unit/msec): V1= 0.8 V2a= 2.4 V2b= 2.6 V3a= 6.3 V3b= 7.0 V4a= 0.0 V4b= 0.0

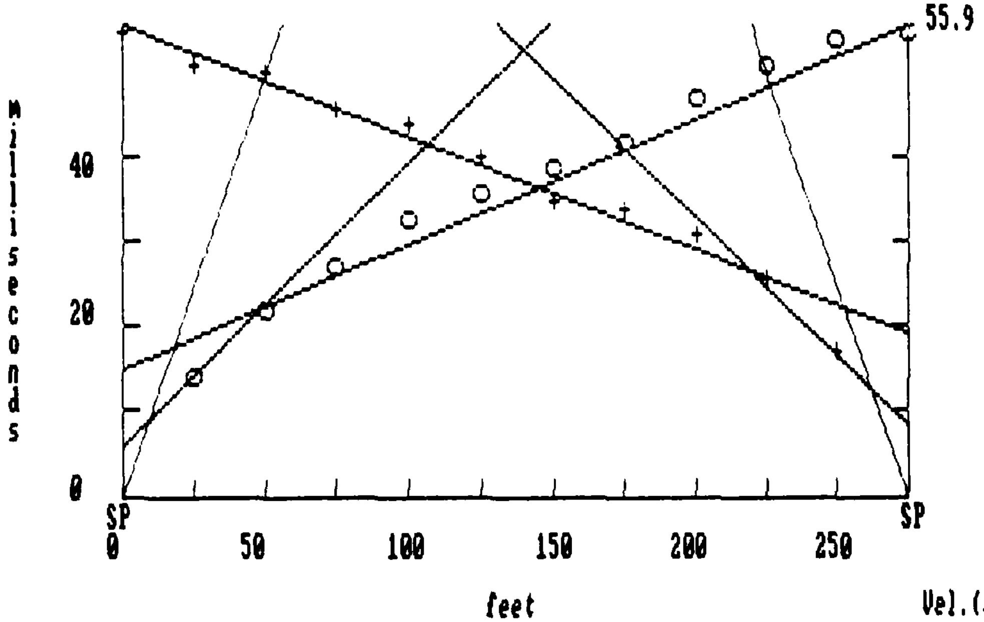


SPREAD 80

V1 = 0.8   V2 = 2.5   V3 = 6.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		18	60			
50	280	28	57	259		
75	280	30	51	264		
100	279	33	47	264		
125	279	38	45	261		
150	278	41	41	261		
175	277	46	38	257		
200	275	49	35	255		
225	273	53	30	255		
250		57	22			
275		64	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.0 V2b= 3.0 V3a= 6.7 V3b= 7.5 V4a= 0.0 V4b= 0.0

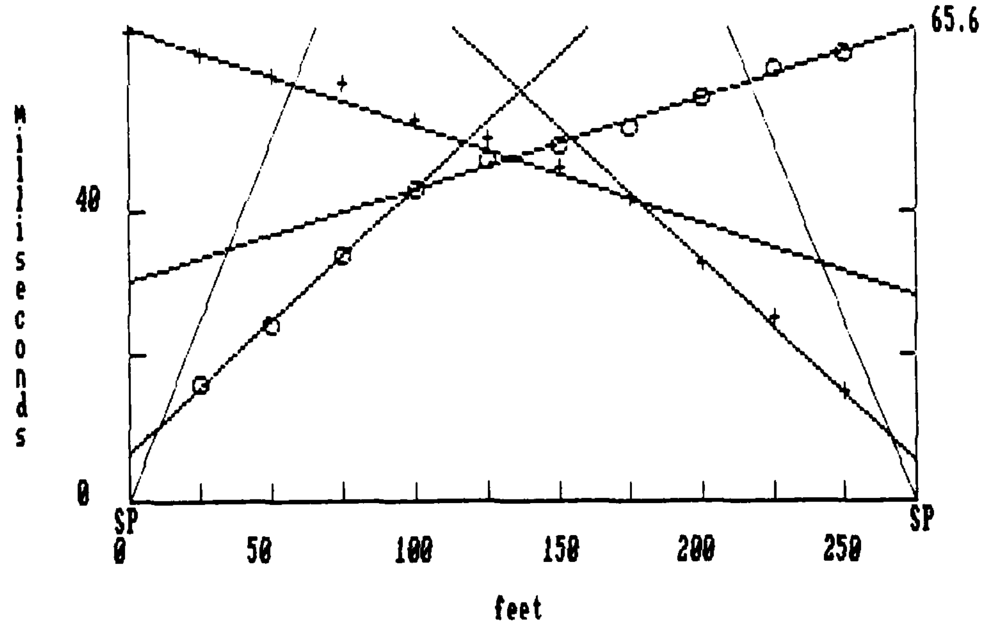


SPREAD 81

V1 = 1.0 V2 = 3.0 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	55			
25		14	51			
50	281	22	50	264		
75	281	27	46	262		
100	281	33	44	255		
125	280	36	40	256		
150	279	39	35	258		
175	279	42	34	255		
200	279	47	31	252		
225	280	51	26	254		
250		54	17			
275		55	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.7 V2b= 2.7 V3a= 7.8 V3b= 7.3 V4a= 0.0 V4b= 0.0

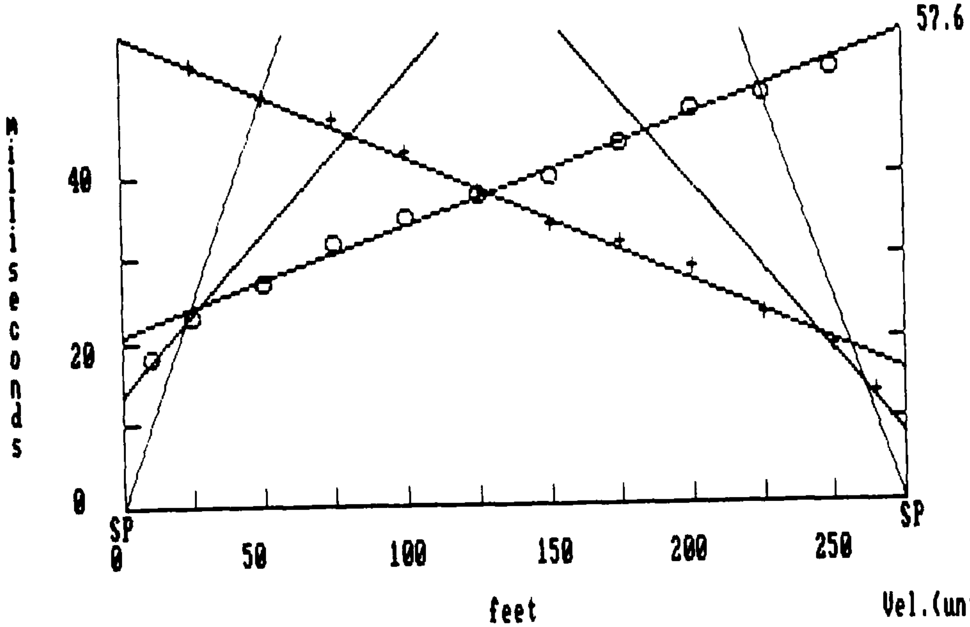


SPREAD 82

V1 = 1.0 V2 = 2.7 V3 = 7.6

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	65			
25		16	62			
50		24	59			
75		34	58			
100	287	43	53	249		
125	286	47	50	246		
150	286	49	46	249		
175	286	52	42	250		
200		56	33			
225		60	25			
250		62	15			
275		66	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.6 V2b= 2.4 V3a= 7.5 V3b= 6.6 V4a= 0.0 V4b= 0.0

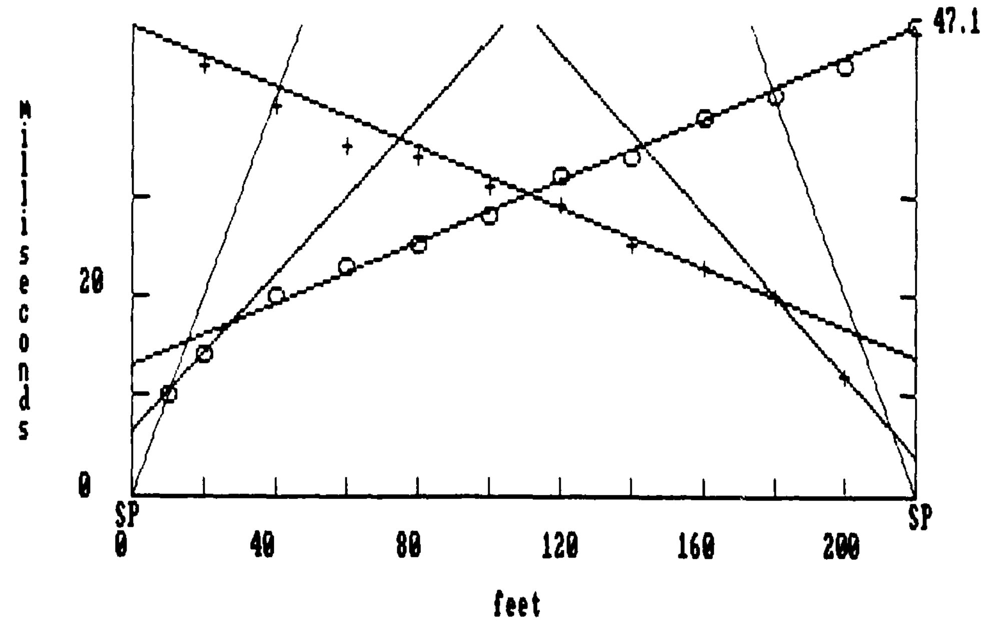


SPREAD 83

V1 = 1.0 V2 = 2.5 V3 = 7.2

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
10		18				
25		23	54			
50	261	27	50	245		
75	261	32	47	243		
100	261	35	43	243		
125	262	38	38.5	247		
150	262	40	34	250		
175	262	44	32	247		
200	263	48	29	247		
225	263	50	23	252		
250		53	19			
265			13			

Vel.(unit/msec): V1= 1.0 V2a= 2.5 V2b= 2.5 V3a= 6.4 V3b= 6.6 V4a= 0.0 V4b= 0.0

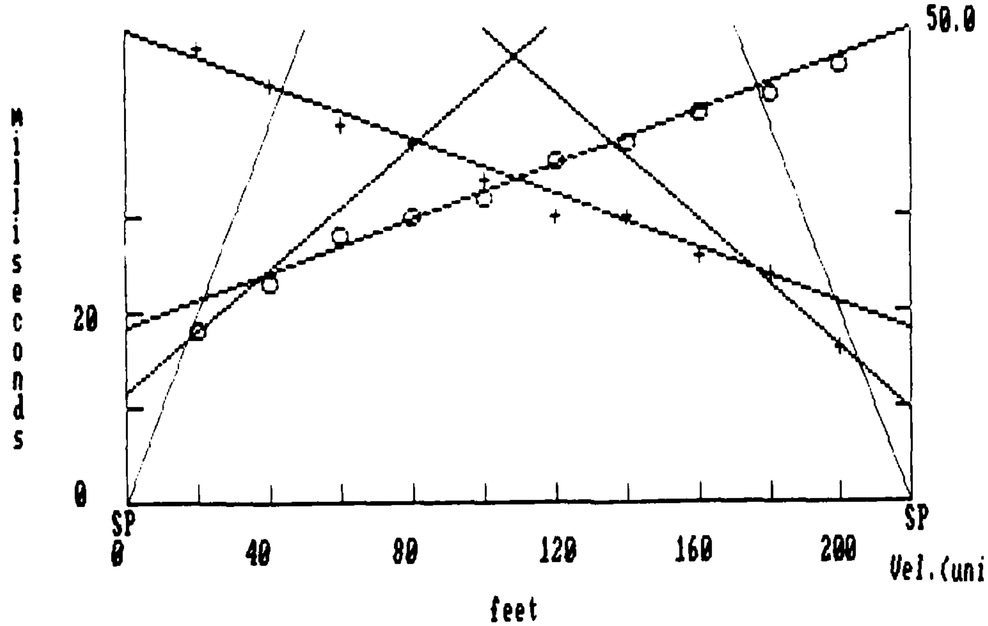


SPREAD 84

V1 = 1.0 V2 = 2.5 V3 = 6.6

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
10		10				
20		14	43			
40	259	20	39	248		
60	259	23	35	249		
80	259	25	34	248		
100	259	28	31	248		
120	258	32	29	245		
140	258	34	25	247		
160	258	38	23	244		
180	257	40	20	245		
200		43	12			
220		47	0			

Vel.(unit/msec): V1= 1.0 V2a= 3.0 V2b= 3.0 V3a= 7.0 V3b= 6.9 V4a= 0.0 V4b= 0.0

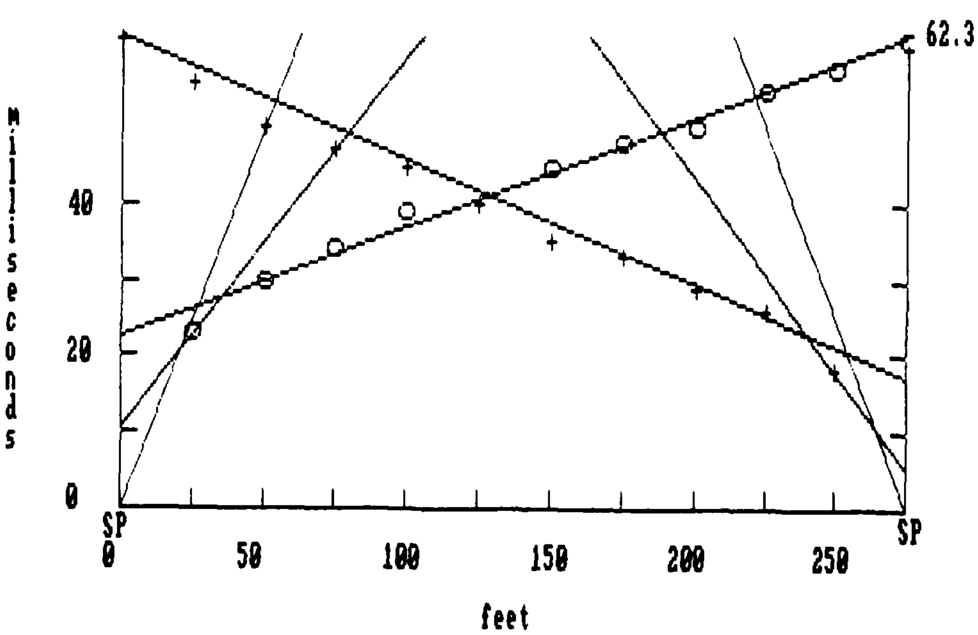


SPREAD 85

V1 = 1.0 V2 = 3.0 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	51			
20		18	48			
40	281	23	44	266		
60	280	28	40	263		
80	279	30	38	262		
100	279	32	34	265		
120	279	36	30	265		
140	278	38	30	261		
160	277	41	26	261		
180	276	43	24	261		
200		46	16			
220		50	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.0 V2b= 2.0 V3a= 6.9 V3b= 6.1 V4a= 0.0 V4b= 0.0

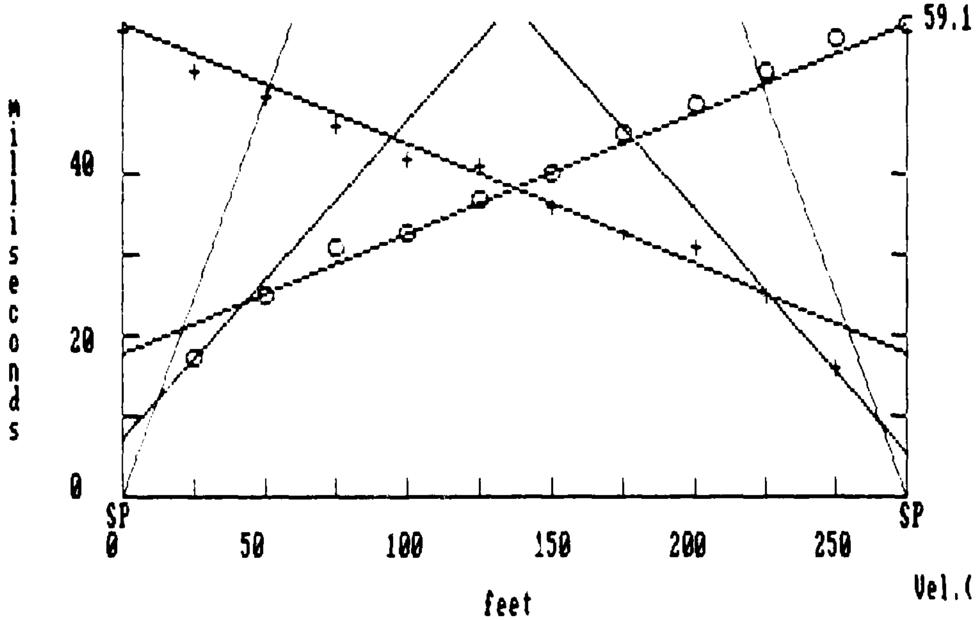


SPREAD 86

V1 = 1.0 V2 = 2.0 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	62			
25		23	56			
50	282	30	50	268		
75	282	34	47	267		
100	283	39	45	265		
125			40			
150	284	45	35	270		
175	284	48	33	269		
200	284	50	29	272		
225	284	55	26	269		
250		58	18			
275		62	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.5 V2b= 2.5 V3a= 6.6 V3b= 6.7 V4a= 0.0 V4b= 0.0

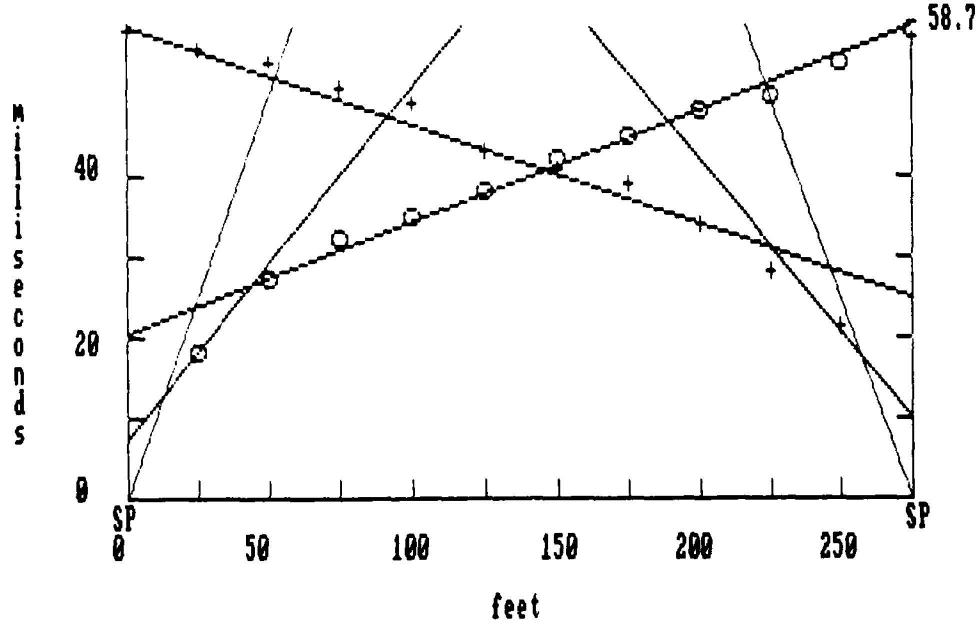


SPREAD 87

V1 = 1.0 V2 = 2.5 V3 = 6.7

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	58			
25		17	53			
50	285	25	50	269		
75	285	31	46	266		
100	284	33	42	268		
125	285	37	41	265		
150	284	40	36	267		
175	284	45	33	264		
200	284	49	31	262		
225	284	53	25	264		
250		57	16			
275		59	0			

Vel.(unit/msec): V1= 1.0 V2a= 2.3 V2b= 2.3 V3a= 7.2 V3b= 8.2 V4a= 0.0 V4b= 0.0



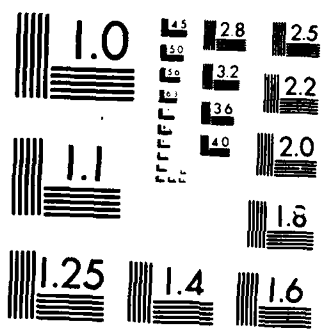
SPREAD 88

V1 = 1.0 V2 = 2.3 V3 = 7.5

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	58			
25		18	56			
50	283	27	54	263		
75	283	32	51	260		
100	283	35	49	260		
125	283	38	43	263		
150	284	42	41	261		
175	284	45	39	261		
200	284	48	34	263		
225		50	28			
250		54	21			
275		58	0			

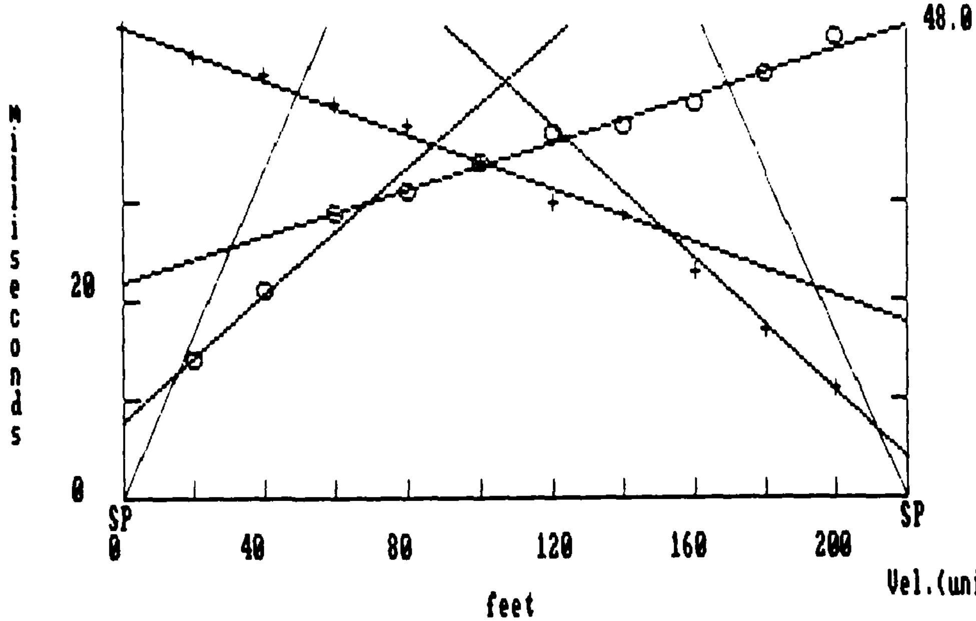
AD-A164 835 INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION S..(U) SCIENCE APPLICATIONS INTERNATIONAL CORP BELLEVE WA R W GREILLING ET AL. 6/7

UNCLASSIFIED 20 DEC 85 SAIC-85/1791 F33615-80-D-4002 F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

Vel.(unit/msec): V1= 1.2 V2a= 3.1 V2b= 2.9 V3a= 8.4 V3b= 7.3 V4a= 0.0 V4b= 0.0



SPREAD 89

V1 = 1.2 V2 = 3.0 V3 = 8.0

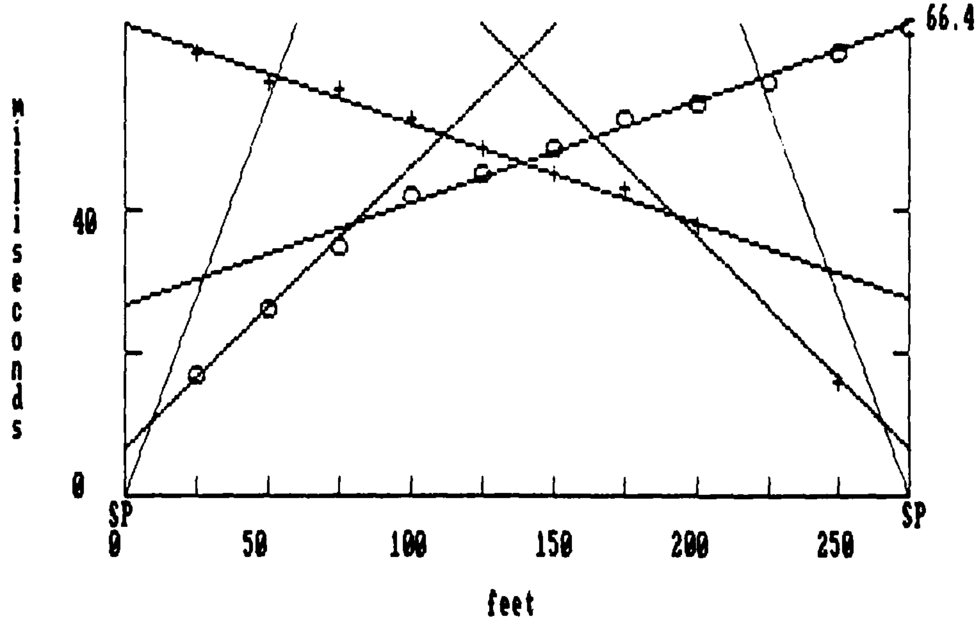
GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	48			
20		14	45			
40		21	43			
60	276	29	40	249		
80	277	31	38	250		
100	277	34	34	251		
120	276	37	30	252		
140	276	38	29	252		
160		40	23			
180		43	17			
200		47	11			
220		49	0			

SPREAD 90

V1 = 0.9 V2 = 2.5 V3 = 7.0

GP STATION	GP ELEV	TIME FORWARD	TIME REVERSE	WT ELEV	TILL ELEV	ESP ELEV
0		0	67			
25		17	62			
50		26	58			
75		35	57			
100	278	42	53			245
125	277	45	49			246
150	276	49	45			245
175	276	53	43			243
200	275	55	38			246
225		58				
250		62	16			
275		66	0			

Vel.(unit/msec): V1= 0.9 V2a= 2.5 V2b= 2.5 V3a= 6.9 V3b= 7.1 V4a= 0.0 V4b= 0.0



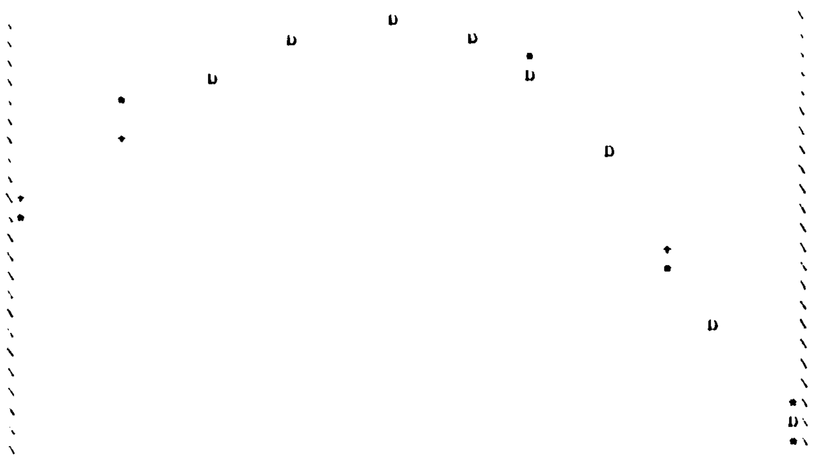
Appendix G.2

Electrical Resistivity Data

DC RESISTIVITY DATA

Schlumberger sounding data as of May, 1985 from each field station at McChord Air Force Base and the American Lake Gardens Tract, Washington are listed on the following pages along with each resistivity curve and inversion. Inversions were calculated using SARI87, a semi-automatic resistivity inversion computer program authored by H.T. Andersen while at the Colorado School of Mines, Golden, Colorado. Below is an explanation of column headings and parameters.

*	= Raw resistivity data point.
+	= Calculated resistivity data point.
D	= Overlapping raw and calculated resistivity data points.
MODEL	= Number of layers modeled.
RESISTIVITIES	= Apparent resistivities in ohm-meters for each layer.
THICKNESSES	= Layer thickness in meters.
SPACING	= AB/2 spacing in meters.
DATA	= Raw apparent resistivities in ohm-meters.
CALC	= Calculated apparent resistivities in ohm-meters from inversion.
%ERROR	= Percent error in deviation of raw data from calculated data.

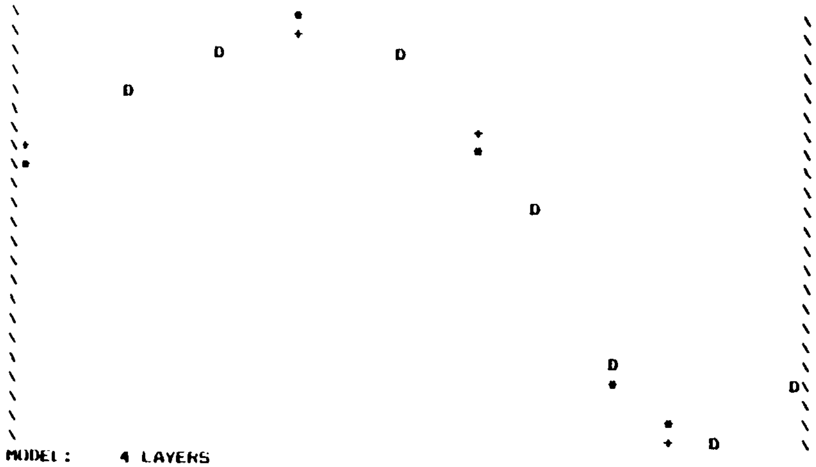


MODEL: 3 LAYERS
RESISTIVITIES:
1.00E+03 8.15E+03 2.80E+02
THICKNESSES:
6.00E-01 3.51E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	1.13E+03	1.39E+03	-19.034
1.50E+00	2.35E+03	1.99E+03	17.989
2.40E+00	2.72E+03	2.75E+03	-.945
3.60E+00	3.42E+03	3.44E+03	-.494
6.10E+00	4.01E+03	3.98E+03	.692
9.10E+00	3.49E+03	3.65E+03	-4.370
1.21E+01	3.03E+03	2.94E+03	3.087
1.21E+01	2.83E+03	2.94E+03	-3.658
1.82E+01	1.74E+03	1.62E+03	7.846
2.42E+01	8.29E+02	8.88E+02	-6.667
3.03E+01	5.53E+02	5.39E+02	2.615
4.55E+01	2.75E+02	3.11E+02	-11.601
4.55E+01	3.51E+02	3.11E+02	12.829

SCHL ARRAY, 13 DATA POINTS, DATA = SDG-B(M)
RMS LOG ERROR = 4.13E-02, ANTILOG YIELDS 9.9657 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.00				
P 2	.00	.99			
P 3	.00	.00	1.00		
T 1	.00	.00	.00	.00	
T 2	.00	.01	.00	.00	.99
	P 1	P 2	P 3	T 1	T 2

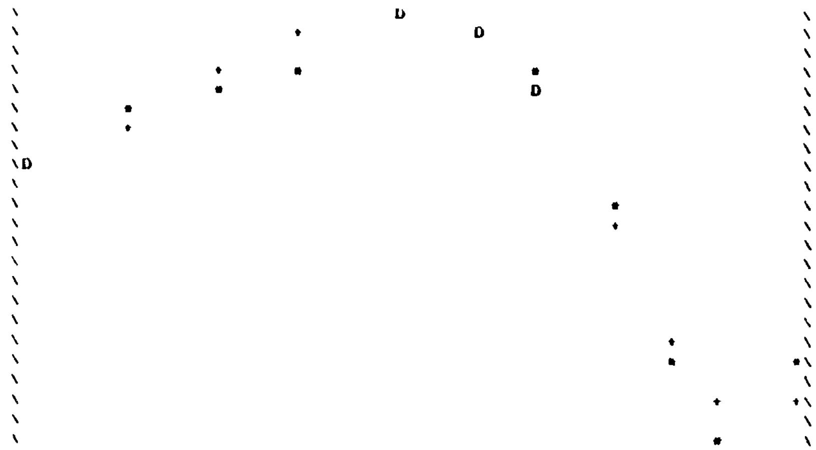


MODEL: 4 LAYERS
RESISTIVITIES:
1.58E+03 1.46E+04 2.92E+02 2.14E+03
THICKNESSES:
2.96E-01 2.46E+00 7.33E+00

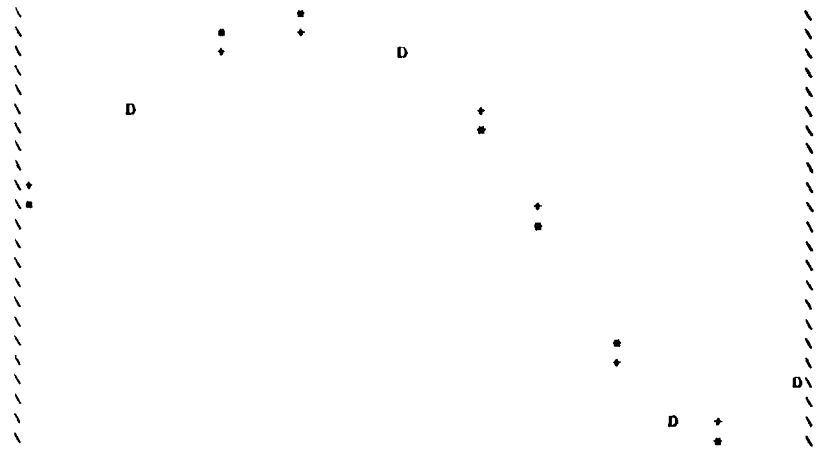
SPACING	DATA	CALC	% ERROR
9.00E-01	3.39E+03	3.73E+03	-9.044
1.50E+00	5.69E+03	5.33E+03	6.855
2.40E+00	7.02E+03	6.82E+03	2.844
3.60E+00	8.30E+03	7.64E+03	8.503
6.10E+00	6.80E+03	6.81E+03	-.162
9.10E+00	3.97E+03	4.53E+03	-12.456
1.21E+01	2.93E+03	2.76E+03	6.254
1.82E+01	1.11E+03	1.15E+03	-4.076
1.82E+01	1.18E+03	1.15E+03	2.256
2.42E+01	8.65E+02	8.15E+02	6.178
3.03E+01	7.93E+02	8.31E+02	-4.527
4.55E+01	1.06E+03	1.07E+03	-.438

SCHL ARRAY, 12 DATA POINTS, DATA = SDG-A(M)
RMS LOG ERROR = 2.81E-02, ANTILOG YIELDS 6.6813 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

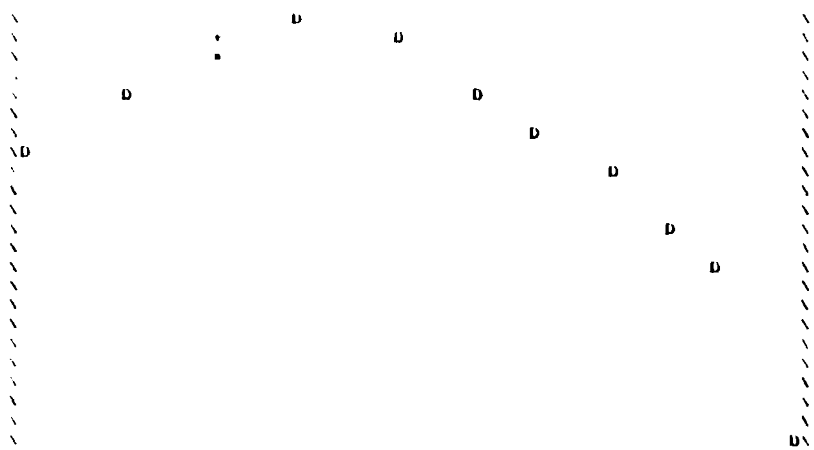
P 1	.50						
P 2	.03	.73					
P 3	.02	-.04	.49				
P 4	-.03	.05	.13	.22			
T 1	-.47	-.10	.02	-.02	.47		
T 2	-.03	.26	.07	-.07	.10	.74	
T 3	-.01	.01	-.45	-.18	.00	.01	.44
	P 1	P 2	P 3	P 4	T 1	T 2	T 3



```
MODEL:     4 LAYERS
RESISTIVITIES:
   1.77E+03   1.42E+04   1.01E+02   7.96E+03
THICKNESSES:
   1.16E+00   1.84E+00   7.44E+00
  SPACING       DATA       CALC      % ERROR
   9.00E-01   1.87E+03   1.89E+03    -1.079
   1.50E+00   2.38E+03   2.24E+03     6.241
   2.40E+00   2.82E+03   2.90E+03    -2.664
   3.60E+00   3.10E+03   3.59E+03   -13.538
   6.10E+00   3.92E+03   4.05E+03    -3.213
   9.10E+00   3.64E+03   3.52E+03     3.344
   1.21E+01   2.83E+03   2.68E+03     5.713
   1.21E+01   3.06E+03   2.68E+03    14.158
   1.82E+01   1.48E+03   1.35E+03     9.538
   2.42E+01   6.63E+02   7.49E+02   -11.442
   3.03E+01   4.64E+02   5.42E+02   -14.364
   4.55E+01   6.73E+02   5.84E+02    15.264
SCHL ARRAY,  12 DATA POINTS, DATA = SDG-C(M)
RMS LOG ERROR -    4.26E-02, ANTILOG YIELDS     10.3189 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1    .94
P 2    .00    .51
P 3    .01    .00    .49
P 4    .00    .00    .04    .01
T 1   -.08   -.06    .02    .00    .86
T 2    .01    .49    .01    .00    .08    .50
T 3    .00    .01   -.48   -.04    .00    .00    .48
       P 1    P 2    P 3    P 4    T 1    T 2    T 3
```



```
MODEL:     4 LAYERS
RESISTIVITIES:
   1.33E+03   3.40E+04   8.65E+02   8.39E+03
THICKNESSES:
   2.77E-01   1.17E+00   2.35E+01
  SPACING       DATA       CALC      % ERROR
   9.00E-01   3.53E+03   3.78E+03    -6.661
   1.50E+00   5.77E+03   5.68E+03     1.721
   2.40E+00   8.17E+03   7.56E+03     8.042
   3.60E+00   9.27E+03   8.68E+03     6.839
   6.10E+00   7.87E+03   7.95E+03     -.904
   9.10E+00   5.46E+03   5.53E+03    -1.307
   1.21E+01   3.40E+03   3.58E+03    -5.202
   1.82E+01   1.78E+03   1.72E+03     3.793
   2.42E+01   1.24E+03   1.24E+03     -.309
   3.03E+01   1.14E+03   1.20E+03    -5.370
   4.55E+01   1.54E+03   1.50E+03     2.256
SCHL ARRAY,  11 DATA POINTS, DATA = SDG-D(M)
RMS LOG ERROR -    2.01E-02, ANTILOG YIELDS      4.7255 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1    .52
P 2    .00    .63
P 3    .06   -.03    .95
P 4   -.01    .00    .00    .04
T 1   -.48   -.07    .06   -.01    .50
T 2   -.02    .38    .05    .00    .05    .61
T 3    .07   -.04   -.08   -.17    .07    .06    .85
       P 1    P 2    P 3    P 4    T 1    T 2    T 3
```

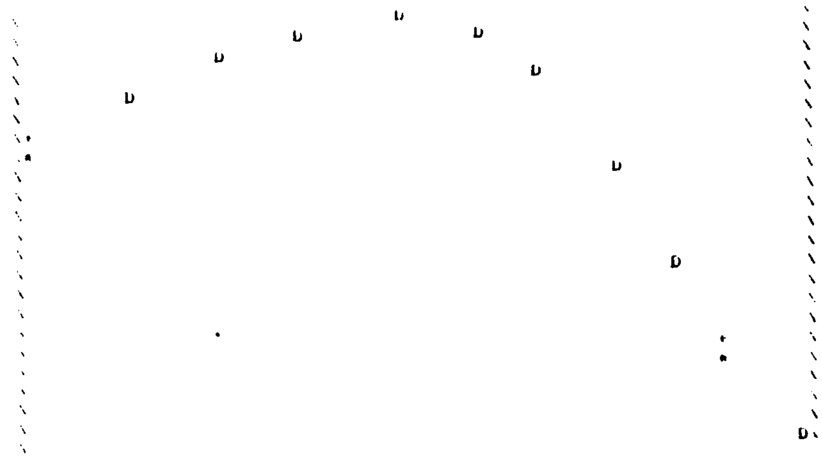


MODEL: 5 LAYERS
RESISTIVITIES:
6.26E+02 1.50E+03 5.44E+02 2.34E+03 1.01E+02
THICKNESSES:
7.03E-01 2.21E+00 6.44E+00 3.25E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	7.12E+02	7.15E+02	-.392
1.50E+00	8.67E+02	8.50E+02	2.034
2.40E+00	9.78E+02	1.00E+03	-2.472
3.60E+00	1.08E+03	1.09E+03	-.436
6.10E+00	1.05E+03	1.03E+03	1.985
9.10E+00	8.89E+02	8.83E+02	.661
1.21E+01	7.63E+02	7.84E+02	-2.634
1.82E+01	6.80E+02	6.77E+02	.410
2.42E+01	5.85E+02	5.95E+02	-1.619
3.03E+01	5.23E+02	5.06E+02	3.261
4.55E+01	3.11E+02	3.18E+02	-2.061

SCHL ARRAY, 11 DATA POINTS, DATA = SDG G(M)
RMS LOG ERROR = 8.23E-03, ANTILOG YIELDS 1.9143 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.93								
P 2	-.02	.81							
P 3	.01	.02	.78						
P 4	.00	-.02	.12	.44					
P 5	.01	-.01	-.05	.11	.24				
T 1	-.13	-.18	.06	-.03	.02	.60			
T 2	.03	.27	.14	-.04	.09	.22	.43		
T 3	.01	.03	-.30	.12	.20	.05	.13	.34	
T 4	.00	-.02	.08	.43	.12	-.02	-.03	.15	.42
	P 1	P 2	P 3	P 4	P 5	T 1	T 2	T 3	T 4

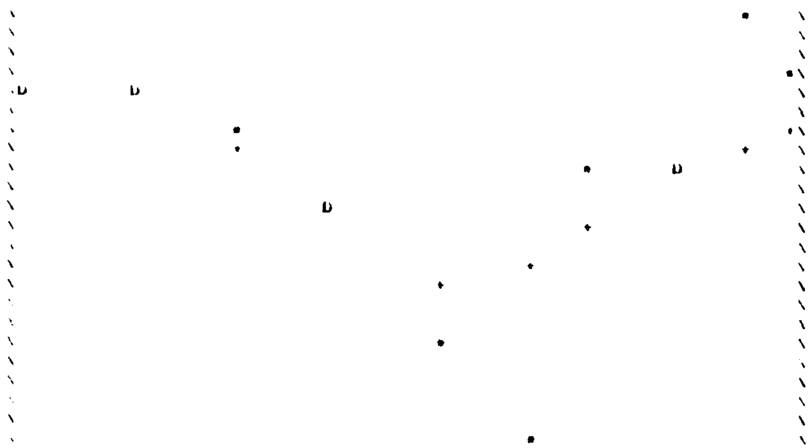


MODEL: 3 LAYERS
RESISTIVITIES:
3.00E+03 1.75E+04 4.43E+02
THICKNESSES:
5.00E-01 4.29E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	4.25E+03	4.50E+03	-5.506
1.50E+00	6.62E+03	6.33E+03	4.591
2.40E+00	8.78E+03	8.37E+03	4.893
3.60E+00	9.62E+03	1.00E+04	-3.947
6.10E+00	1.04E+04	1.09E+04	-5.121
9.10E+00	9.52E+03	9.48E+03	.384
1.21E+01	7.52E+03	7.24E+03	3.885
1.82E+01	3.67E+03	3.57E+03	2.757
2.42E+01	1.72E+03	1.74E+03	-1.153
3.03E+01	9.08E+02	9.33E+02	-2.645
4.55E+01	4.87E+02	4.80E+02	1.385

SCHL ARRAY, 11 DATA POINTS, DATA = SDG-H(M)
RMS LOG ERROR = 1.61E-02, ANTILOG YIELDS 3.7793 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.00				
P 2	.00	1.00			
P 3	.00	.00	1.00		
F 1	.00	.00	.00	.00	
T 2	.00	.00	.00	.00	1.00
	P 1	P 2	P 3	F 1	T 2



MODEL: 4 LAYERS

RESISTIVITIES:

5.00E+03 1.03E+02 2.85E+04 1.00E+01

THICKNESSES:

1.40E+00 7.14E-01 2.38E+01

SPACING	DATA	CALC	% ERROR
9.00E-01	4.48E+03	4.76E+03	-5.917
1.50E+00	4.37E+03	4.17E+03	4.607
2.40E+00	3.44E+03	2.91E+03	18.167
3.60E+00	1.83E+03	1.67E+03	9.643
6.10E+00	5.78E+02	9.70E+02	-40.387
9.10E+00	2.75E+02	1.19E+03	-76.802
1.21E+01	2.40E+03	1.55E+03	54.870
1.82E+01	2.43E+03	2.26E+03	7.603
2.42E+01	8.39E+03	2.90E+03	189.388
3.03E+01	5.30E+03	3.47E+03	52.433

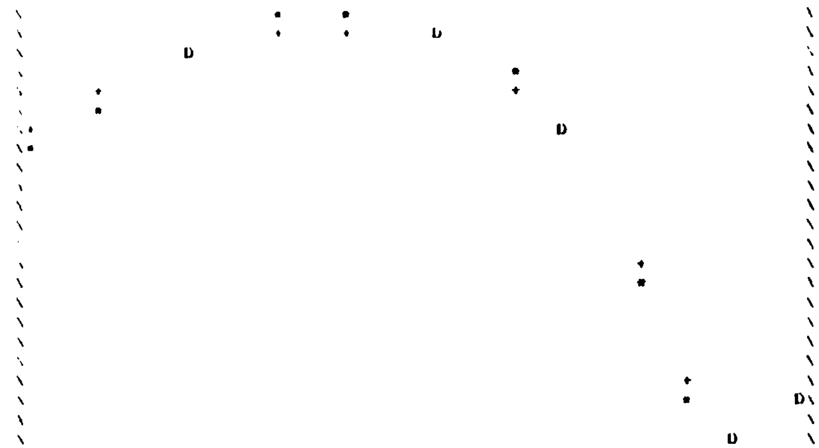
SCHL ARRAY, 10 DATA POINTS, DATA - SDG M(M)

RMS LOG ERROR - 2.73E-01, ANTILOG YIELDS 87.4491 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

F 1	.00						
P 2	.00	.46					
P 3	.00	.04	.02				
F 4	.00	.00	.00	.00			
T 1	.00	.02	-.01	.00	.90		
T 2	.00	.46	-.05	.00	.00	.46	
T 3	.00	.02	.01	.00	.00	-.02	.01
	F 1	P 2	P 3	F 4	T 1	T 2	T 3



MODEL: 4 LAYERS

RESISTIVITIES:

5.00E+02 8.79E+04 1.09E+01 5.00E+03

THICKNESSES:

9.95E-02 4.55E-01 4.28E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	2.10E+03	2.81E+03	-25.140
9.00E-01	3.47E+03	4.06E+03	-14.595
1.50E+00	5.84E+03	6.08E+03	-3.819
2.40E+00	9.17E+03	7.97E+03	15.050
3.60E+00	1.02E+04	8.89E+03	14.482
6.10E+00	8.66E+03	7.51E+03	15.361
9.10E+00	5.12E+03	4.54E+03	12.705
1.21E+01	2.84E+03	2.40E+03	18.069
1.82E+01	4.54E+02	5.52E+02	-17.828
2.42E+01	1.26E+02	1.33E+02	-5.534
3.03E+01	7.80E+01	7.57E+01	3.029
4.55E+01	1.29E+02	1.28E+02	.525

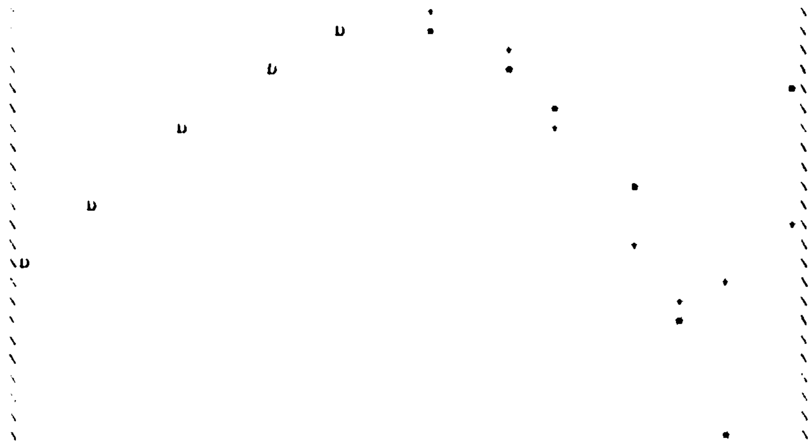
SCHL ARRAY, 12 DATA POINTS, DATA = SDG-N(M)

RMS LOG ERROR - 6.31E-02, ANTILOG YIELDS 15.6344 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

F 1	.00						
P 2	.00	.50					
P 3	.00	.00	.51				
F 4	.00	.00	.00	.00			
T 1	.00	-.01	.00	.00	1.00		
T 2	.00	.50	.00	.00	.01	.50	
T 3	.00	.00	-.49	.00	.00	.00	.51
	F 1	P 2	P 3	F 4	T 1	T 2	T 3



MODEL: 4 LAYERS

RESISTIVITIES:

1.82E+03 1.62E+04 2.60E+02 8.14E+04

THICKNESSES:

4.32E-01 3.01E+00 3.75E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	2.50E+03	2.45E+03	2.212
9.00E-01	3.27E+03	3.22E+03	1.742
1.50E+00	4.82E+03	4.71E+03	2.282
2.40E+00	6.32E+03	6.35E+03	.331
3.60E+00	7.25E+03	7.63E+03	4.886
6.10E+00	7.45E+03	8.04E+03	7.355
9.10E+00	6.15E+03	6.59E+03	6.642
1.21E+01	5.33E+03	4.87E+03	9.594
1.82E+01	3.58E+03	2.75E+03	30.367
2.42E+01	1.86E+03	2.14E+03	13.229
3.03E+01	1.12E+03	2.20E+03	49.291
4.55E+01	5.79E+03	3.07E+03	88.686

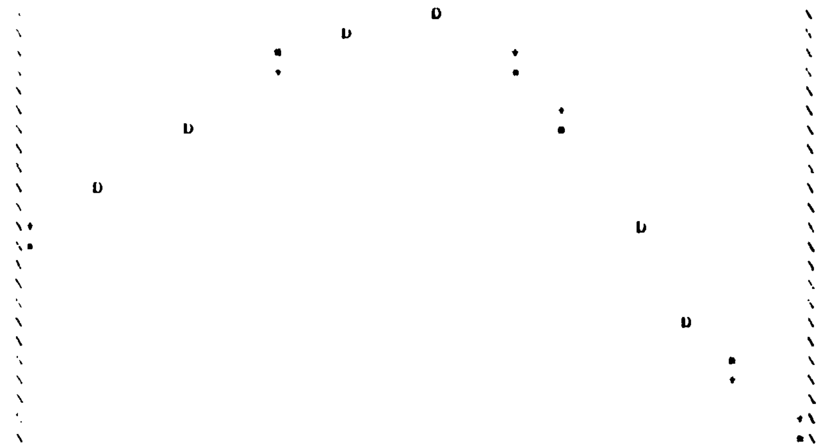
SCHL ARRAY, 12 DATA POINTS, DATA - SDG-D(M)

RMS LOG ERROR - 1.24E-01, ANTILOG YIELDS 33.0299 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.82						
P 2	.06	.71					
P 3	.00	.01	.49				
P 4	.00	.01	.03	.01			
T 1	.22	-.16	.01	.00	.68		
T 2	.06	.29	.02	.01	.16	.69	
T 3	.00	.00	.49	-.03	.00	.01	.50
	P 1	P 2	P 3	P 4	T 1	T 2	T 3



MODEL: 3 LAYERS

RESISTIVITIES:

8.69E+02 4.33E+03 4.05E+02

THICKNESSES:

4.90E-01 4.14E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	1.03E+03	1.05E+03	-1.443
9.00E-01	1.26E+03	1.29E+03	-2.142
1.50E+00	1.68E+03	1.78E+03	-5.564
2.40E+00	2.45E+03	2.30E+03	6.261
3.60E+00	2.85E+03	2.70E+03	5.475
6.10E+00	3.00E+03	2.87E+03	4.652
9.10E+00	2.39E+03	2.47E+03	-3.403
1.21E+01	1.81E+03	1.92E+03	-5.930
1.82E+01	1.08E+03	1.10E+03	-1.435
2.42E+01	7.15E+02	7.04E+02	1.570
3.03E+01	5.80E+02	5.34E+02	8.617
4.55E+01	4.01E+02	4.32E+02	-7.156

SCHL ARRAY, 12 DATA POINTS, DATA = SDG-R(M)

RMS LOG ERROR - 2.18E-02, ANTILOG YIELDS 5.1520 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.92				
P 2	-.03	.89			
P 3	.00	-.02	.97		
T 1	-.13	-.11	-.01	.73	
T 2	.04	.11	.03	.13	.87
	P 1	P 2	P 3	T 1	T 2

MODEL: 5 LAYERS
RESISTIVITIES:

6.06E+02	8.80E+01	7.50E+02	2.89E+01	1.00E+05

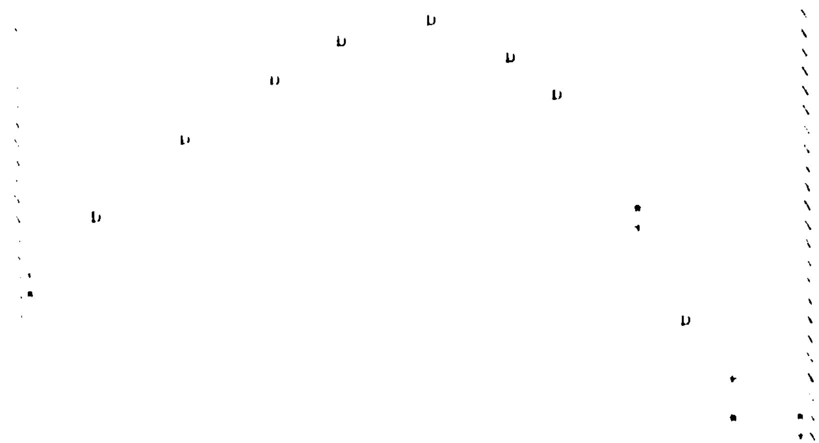
THICKNESSES:

5.19E-01	1.11E+00	5.30E+00	6.75E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	5.11E+02	5.07E+02	.690
9.00E-01	3.78E+02	3.90E+02	-3.076
1.50E+00	2.39E+02	2.28E+02	4.696
2.40E+00	1.64E+02	1.75E+02	-6.096
3.60E+00	2.13E+02	2.06E+02	3.613
6.10E+00	2.85E+02	2.81E+02	1.430
9.10E+00	3.15E+02	3.27E+02	-3.614
1.21E+01	3.32E+02	3.37E+02	-1.451
1.82E+01	3.17E+02	3.03E+02	4.553
2.42E+01	2.98E+02	2.57E+02	15.799
3.03E+01	1.85E+02	2.26E+02	-18.037
4.55E+01	2.30E+02	2.17E+02	5.813

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-S(M)
RMS LOG ERROR = 3.46E-02, ANTILOG YIELDS 8.3045 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.95								
P 2	.04	.60							
P 3	.01	.01	.61						
P 4	.00	.01	.01	.48					
P 5	.00	.00	.00	.00	.00				
T 1	.04	.12	.02	.00	.00	.93			
T 2	-.04	-.43	-.11	.02	.00	.12	.49		
T 3	-.01	.02	.41	.03	.00	.02	.10	.53	
T 4	.00	.00	.01	-.48	.00	.00	-.01	.00	.48
	P 1	P 2	P 3	P 4	P 5	T 1	T 2	T 3	T 4



MODEL: 3 LAYERS
RESISTIVITIES:

1.35E+03	6.17E+04	1.19E+03

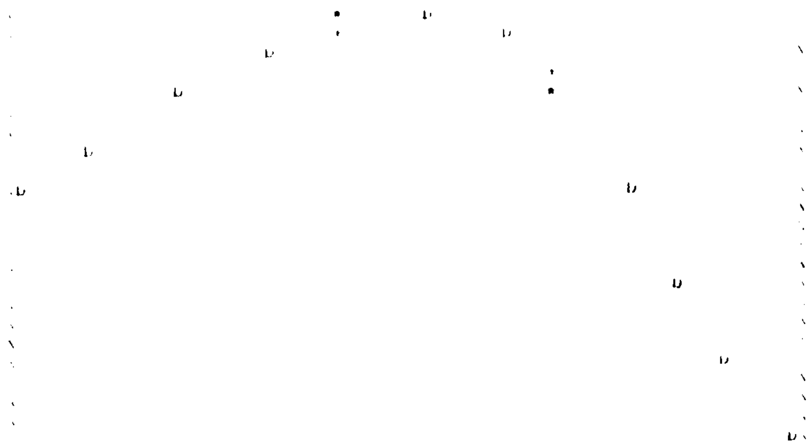
THICKNESSES:

2.08E-01	1.59E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	3.22E+03	3.65E+03	11.874
9.00E-01	5.17E+03	5.30E+03	-2.522
1.50E+00	8.23E+03	8.27E+03	-.575
2.40E+00	1.21E+04	1.17E+04	3.419
3.60E+00	1.52E+04	1.45E+04	4.950
6.10E+00	1.67E+04	1.59E+04	5.473
9.10E+00	1.39E+04	1.33E+04	4.673
1.21E+01	1.01E+04	9.87E+03	2.720
1.82E+01	5.39E+03	4.81E+03	11.314
2.42E+01	2.45E+03	2.59E+03	-5.540
3.03E+01	1.41E+03	1.69E+03	-16.995
4.55E+01	1.42E+03	1.25E+03	13.027

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-1(H)
RMS LOG ERROR = 3.77E-02, ANTILOG YIELDS 9.0751 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.52				
P 2	.00	.53			
P 3	.03	-.01	.95		
T 1	.43	-.05	.03	.51	
T 2	-.02	.46	.02	.04	.53
	P 1	P 2	P 3	T 1	T 2



MODEL: [illegible] LAYERS
RESISTIVITIES:
1.[illegible]E+0[illegible] 2.75E+04 3.4[illegible]E+0[illegible]
THICKNESSES:
[illegible]E+01 [illegible].18E+00

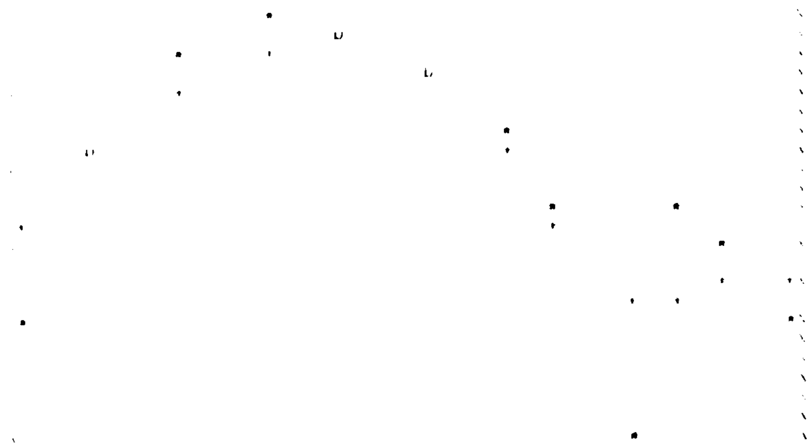
SPACING	DATA	CALC	% ERROR
[illegible]E-01	[illegible].45E+0[illegible]	[illegible].45E+0[illegible]	[illegible]
9.00E-01	[illegible]E+03	[illegible].4[illegible]E+0[illegible]	5.505
1.50E+00	[illegible].40E+03	[illegible]E+0[illegible]	4.049
[illegible].40E+00	7.[illegible]E+03	7.37E+03	[illegible]
[illegible]E+00	9.4[illegible]E+0[illegible]	9.1[illegible]E+0[illegible]	[illegible]
6.10E+00	1.01E+04	9.99E+03	1.[illegible]1
9.10E+00	8.21E+0[illegible]	8.[illegible]E+0[illegible]	1.[illegible]
1.21E+01	5.72E+03	6.07E+03	[illegible]
1.8[illegible]E+01	[illegible].[illegible]9E+0[illegible]	2.7[illegible]E+0[illegible]	1.[illegible]74
[illegible].4[illegible]E+01	1.[illegible]E+03	1.2[illegible]E+0[illegible]	[illegible].046
[illegible]E+01	6.[illegible]E+02	[illegible]E+02	[illegible]
4.55E+01	[illegible]E+02	[illegible].59E+02	[illegible]

SCHL ARRAY, 12 DATA POINTS, DATA - SDG W(H)
RMS LOG ERROR - 1.40E-02, ANTILOG YIELDS 3.2[illegible]44 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1 .[illegible]
P 2 .[illegible] .87
P 3 .01 .00 1.00
T 1 .1[illegible] .1[illegible] .01 .78
T 2 .00 .12 .00 .11 .88
P 1 P 2 P 3 T 1 T 2

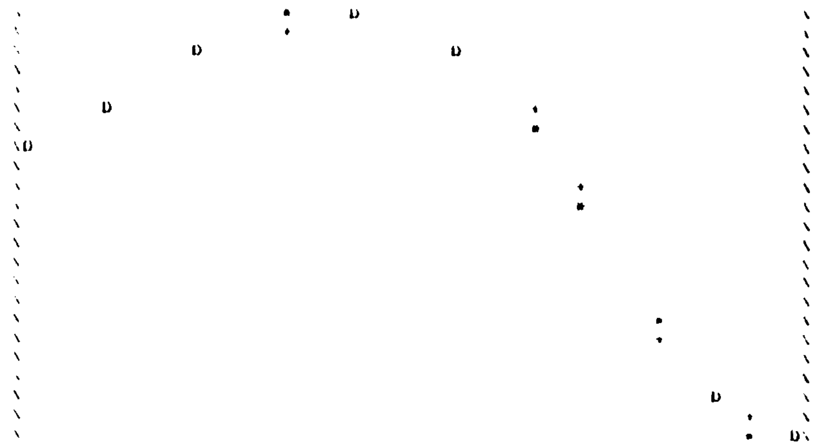
MODEL: 3 LAYERS
RESISTIVITIES:
2.20E+03 9.78E+03 6.18E+02
THICKNESSES:
1.00E+00 5.67E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	2.38E+03	2.27E+03	4.690
9.00E-01	2.77E+03	2.39E+03	15.540
1.50E+00	3.23E+03	2.87E+03	12.293
2.40E+00	3.69E+03	3.74E+03	1.288
3.60E+00	4.50E+03	4.68E+03	-3.752
6.10E+00	5.35E+03	5.75E+03	-6.874
9.10E+00	5.77E+03	5.94E+03	-2.849
1.21E+01	5.76E+03	5.45E+03	5.666
1.82E+01	4.14E+03	3.85E+03	7.441
2.42E+01	2.55E+03	2.54E+03	.386
3.03E+01	1.56E+03	1.69E+03	-7.600
4.55E+01	8.76E+02	8.54E+02	2.568

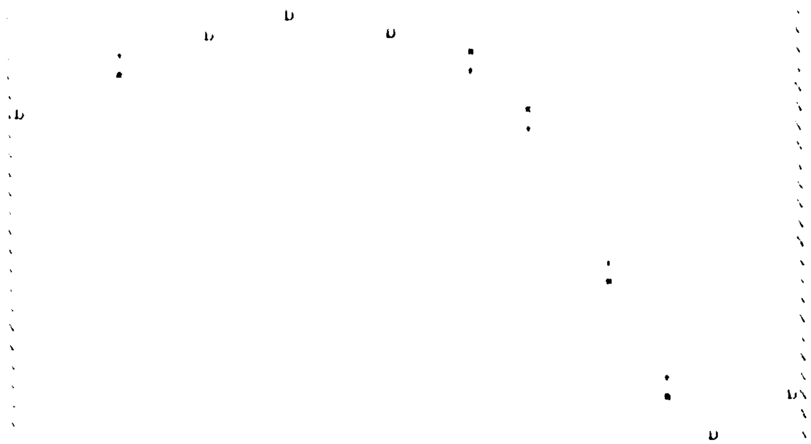
SCHL ARRAY, 12 DATA POINTS, DATA - SDG-X
RMS LOG ERROR - 3.05E-02, ANTILOG YIELDS 7.2662 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1 .00
P 2 .00 .23
P 3 .00 .05 .06
T 1 .00 .00 .00 .00
T 2 .00 .21 .09 .00 .26
P 1 P 2 P 3 T 1 T 2



```
MODEL:     5 LAYERS
RESISTIVITIES:
   1.04E+0[illegible]   [illegible]E+04   4.67E+0[illegible]   1.60E+04   1.00E+0[illegible]
THICKNESSES:
   1.[illegible]4E 01   1.[illegible]E+00   [illegible]E+00   [illegible]E+00
  SPACING      DATA        CALC       % ERROR
   [illegible]   [illegible]   [illegible]   4.[illegible]
   9.[illegible]   [illegible]   5.57E+0[illegible]   [illegible]
   1.5[illegible]   1.[illegible]E+04   [illegible]   1.1[illegible]
   2.4[illegible]   1.[illegible]E+04   1.02E+04   22.5[illegible]
   [illegible]   1.18E+04   1.11E+04   6.[illegible]
   [illegible]   [illegible]   9.11E+0[illegible]   [illegible]
   9.1[illegible]   [illegible]   [illegible]E+03   13.[illegible]
   1.2[illegible]   4.1[illegible]   [illegible]   11.[illegible]4
   1.[illegible]   1.1[illegible]   2.4[illegible]   [illegible]
   [illegible]   4.41E+03   2.40E+0[illegible]   7[illegible]
   [illegible]   [illegible]   2.[illegible]   [illegible]
   4.[illegible]   [illegible]   [illegible].85E+0[illegible]   -19.748
SCHL ARRAY,  12 DATA POINTS, DATA - SDG-[illegible]
RMS LOG ERROR -    1.52E 01, ANTILOG YIELDS    41.[illegible] %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
F 1   .42
F 2   .0[illegible]   .47
F 3   .01   .[illegible]   .24
F 4   .00   .01   .12   .16
F 5   .00   .00   .00   .00   .00
T 1   .4[illegible]   .06   .02   .01   .00   .4[illegible]
T 2   .06   .4   .05   .02   .00   .05   .46
T 3   .01   .01   .[illegible]4   -.1[illegible]   .00   .02   .[illegible]   .34
T 4   .00   .01   .11   .1[illegible]   .00   .01   .0[illegible]   .11   .14
       F 1   F 2   F [illegible]   F 4   F 5   T 1   T 2   T [illegible]   T 4
```



```
MODEL:     4 LAYERS
RESISTIVITIES:
   1.28E+03   7.95E+03   3.30E+02   3.05E+03
THICKNESSES:
   2.54E 01   2.96E+00   7.73E+01
  SPACING      DATA        CALC       % ERROR
   6.00E 01   2.24E+03   2.33E+03    3.931
   9.00E-01   2.96E+03   3.08E+03   -3.813
   1.50E+00   4.32E+03   4.14E+03    4.349
   2.40E+00   5.47E+03   5.00E+03    9.335
   3.60E+00   5.64E+03   5.34E+03    5.481
   6.10E+00   4.36E+03   4.49E+03   -2.920
   9.10E+00   2.67E+03   2.88E+03   -7.220
   1.21E+01   1.58E+03   1.71E+03   -7.705
   1.82E+01   7.48E+02   6.76E+02   10.695
   2.42E+01   4.44E+02   4.16E+02    6.780
   3.03E+01   3.39E+02   3.62E+02   -6.278
   3.79E+01   3.47E+02   3.58E+02    2.991
SCHL ARRAY,  12 DATA POINTS, DATA - SDG-ABIM
RMS LOG ERROR -    2.76E-02, ANTILOG YIELDS    6.5584 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1   .57
P 2   -.02   .89
P 3   .01   .02   .97
P 4   .00   .00   .01   .00
T 1   .46   .09   .00   .00   .45
T 2   .02   .10   .02   .01   .09   .90
T 3   .01   .02   .05   .00   .00   .02   .02
       P 1   P 2   P 3   P 4   T 1   T 2   T 3
```

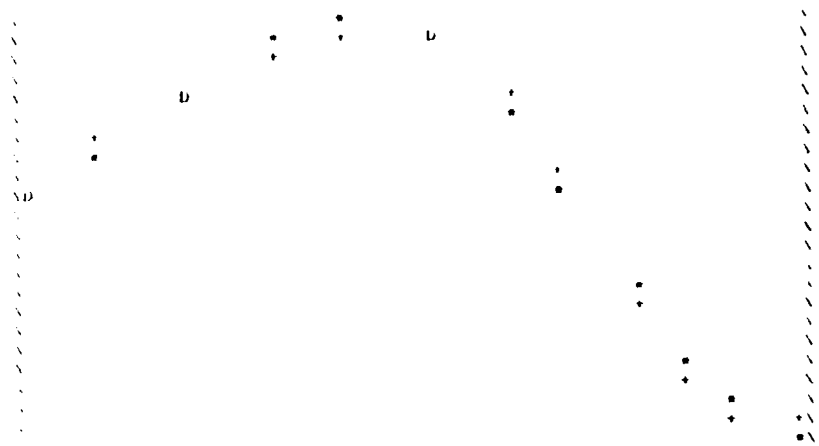


MODEL: 4 LAYERS
RESISTIVITIES:
2.91E+03 4.27E+04 2.64E+02 1.01E+04
THICKNESSES:
2.34E-01 2.31E+00 1.76E+01

SPACING	DATA	CALC	% ERROR
9.00E-01	9.03E+03	9.00E+03	.329
1.50E+00	1.28E+04	1.31E+04	-2.525
2.40E+00	1.70E+04	1.72E+04	-1.249
3.60E+00	1.88E+04	1.97E+04	-4.308
6.10E+00	1.76E+04	1.80E+04	-2.050
9.10E+00	1.30E+04	1.21E+04	7.636
1.21E+01	8.09E+03	7.16E+03	12.913
1.82E+01	2.06E+03	2.19E+03	5.906
2.42E+01	7.33E+02	7.92E+02	7.450
3.03E+01	5.38E+02	5.11E+02	5.348
4.55E+01	6.69E+02	6.77E+02	1.249

SCHL ARRAY, 11 DATA POINTS, DATA - SDG ADCM
RMS LOG ERROR - 2.48E-02, ANTILOG YIELDS 5.803 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.51						
P 2	.03	.63					
P 3	.05	.05	.59				
P 4	.00	.01	.03	.00			
T 1	.45	-.11	.04	.00	.50		
T 2	.04	.35	.07	-.01	.10	.65	
T 3	.02	.03	.43	.04	.02	.05	.46
	P 1	P 2	P 3	P 4	T 1	T 2	T 3

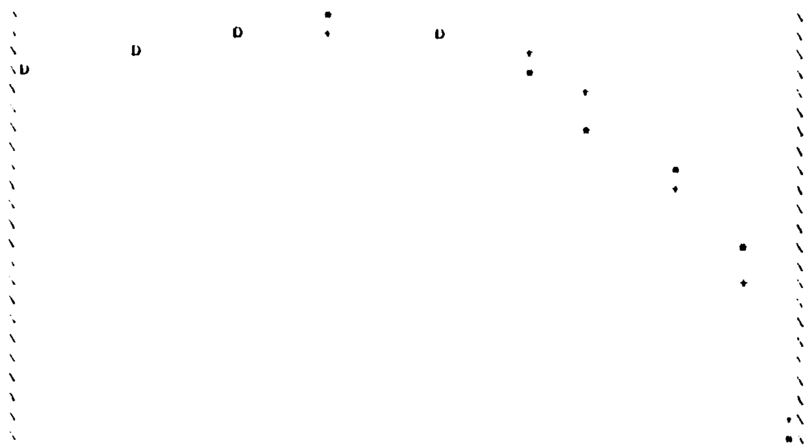


MODEL: 3 LAYERS
RESISTIVITIES:
7.52E+02 4.70E+03 2.50E+02
THICKNESSES:
3.38E-01 2.99E+00

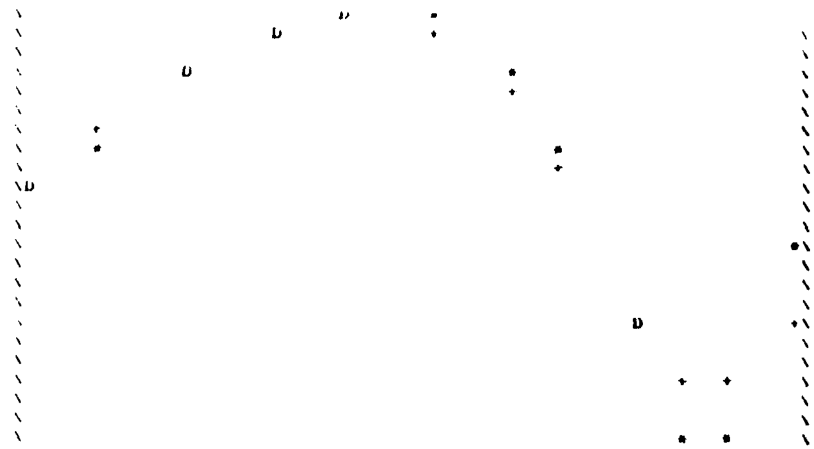
SPACING	DATA	CALC	% ERROR
6.00E-01	1.12E+03	1.13E+03	-.692
9.00E-01	1.41E+03	1.49E+03	-5.265
1.50E+00	2.06E+03	2.07E+03	-.376
2.40E+00	2.74E+03	2.60E+03	5.247
3.60E+00	3.17E+03	2.90E+03	9.330
6.10E+00	2.74E+03	2.66E+03	2.776
9.10E+00	1.74E+03	1.88E+03	-7.367
1.21E+01	1.09E+03	1.22E+03	-10.820
1.82E+01	5.83E+02	5.46E+02	6.874
2.42E+01	3.65E+02	3.36E+02	8.495
3.03E+01	2.85E+02	2.78E+02	2.639
4.55E+01	2.35E+02	2.60E+02	-9.746

SCHL ARRAY, 12 DATA POINTS, DATA = SDG-ADCM
RMS LOG ERROR - 2.95E-02, ANTILOG YIELDS 7.039 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

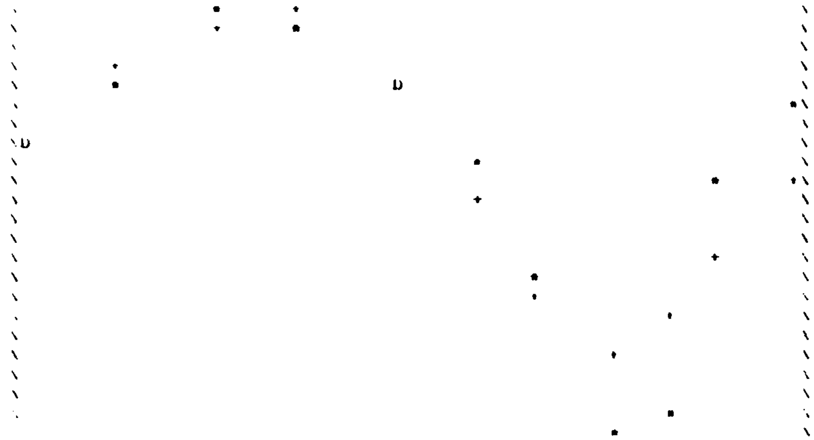
P 1	.87				
P 2	.03	.99			
P 3	.00	.00	1.00		
T 1	-.15	.04	.00	.81	
T 2	.03	.01	.00	.04	.99
	P 1	P 2	P 3	T 1	T 2



```
MODEL:    4 LAYERS
RESISTIVITIES:
   3.49E+03   1.70E+04   9.38E+02   1.00E+04
THICKNESSES:
   3.07E-01   3.83E+00   3.07E+00
  SPACING       DATA        CALC       % ERROR
   9.00E-01   6.61E+03   6.90E+03    -4.313
   1.50E+00   8.77E+03   9.26E+03    -5.369
   2.40E+00   1.11E+04   1.13E+04    -1.671
   3.60E+00   1.47E+04   1.23E+04    19.475
   6.10E+00   1.20E+04   1.14E+04     5.364
   9.10E+00   7.02E+03   8.13E+03   -13.637
   1.21E+01   3.62E+03   5.09E+03    28.889
   1.82E+01   1.87E+03   1.62E+03    15.288
   2.42E+01   7.08E+02   4.32E+02    64.015
   3.03E+01   5.90E+01   7.66E+01   -23.027
SCHL ARRAY,  10 DATA POINTS, DATA = SDG-AB(M
RMS LOG ERROR =    9.82E-02, ANTILOG YIELDS    25.3624 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1   .20
P 2   .05   .37
P 3   .01   .01   .00
P 4   .00   .00   .00   .00
T 1   .19  -.04   .01   .00   .19
T 2   .19   .30   .04   .00   .19   .68
T 3   .02   .01   .01   .00   .02   .07   .01
      P 1   P 2   P 3   P 4   T 1   T 2   T 3
```



```
MODEL:    4 LAYERS
RESISTIVITIES:
   8.86E+02   4.40E+04   1.10E+02   6.15E+04
THICKNESSES:
   1.38E-01   1.23E+00   4.05E+00
  SPACING       DATA        CALC       % ERROR
   6.00E-01   3.37E+03   3.49E+03    -3.468
   9.00E-01   4.65E+03   5.02E+03    -7.406
   1.50E+00   7.19E+03   7.54E+03    -4.601
   2.40E+00   9.93E+03   1.00E+04     -.818
   3.60E+00   1.15E+04   1.14E+04      .414
   6.10E+00   1.13E+04   1.01E+04    11.014
   9.10E+00   7.48E+03   6.60E+03    13.317
   1.21E+01   4.56E+03   3.85E+03    18.300
   1.82E+01   1.38E+03   1.36E+03     1.392
   2.42E+01   5.89E+02   8.32E+02   -29.177
   3.03E+01   6.17E+02   8.57E+02   -28.042
   4.55E+01   2.19E+03   1.28E+03    71.135
SCHL ARRAY,  12 DATA POINTS, DATA = SDG-AH(M
RMS LOG ERROR =    9.55E-02, ANTILOG YIELDS    24.5992 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1   .52
P 2   .01   .52
P 3   .01   .00   .49
P 4   .00   .00   .02   .00
T 1  -.47  -.05   .02   .00   .52
T 2  -.02   .47   .01   .00   .04   .52
T 3  -.01   .00  -.49  -.02  -.01   .00   .49
      P 1   P 2   P 3   P 4   T 1   T 2   T 3
```



MODEL: 4 LAYERS

RESISTIVITIES:

3.04E+03 5.23E+04 6.60E+02 7.96E+05

THICKNESSES:

2.42E-01 1.16E+00 4.37E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	9.12E+03	9.21E+03	1.023
1.40E+00	1.22E+04	1.26E+04	-2.917
2.40E+00	1.74E+04	1.63E+04	7.070
3.60E+00	1.60E+04	1.68E+04	-4.481
6.10E+00	1.19E+04	1.22E+04	-2.607
9.10E+00	7.73E+03	6.88E+03	12.3[illegible]1
1.21E+01	4.51E+03	4.20E+03	7.196
1.82E+01	2.05E+03	3.14E+03	-34.857
2.42E+01	2.34E+03	3.81E+03	38.557
3.03E+01	7.59E+03	4.77E+03	59.081
4.55E+01	1.02E+04	7.14E+03	43.382

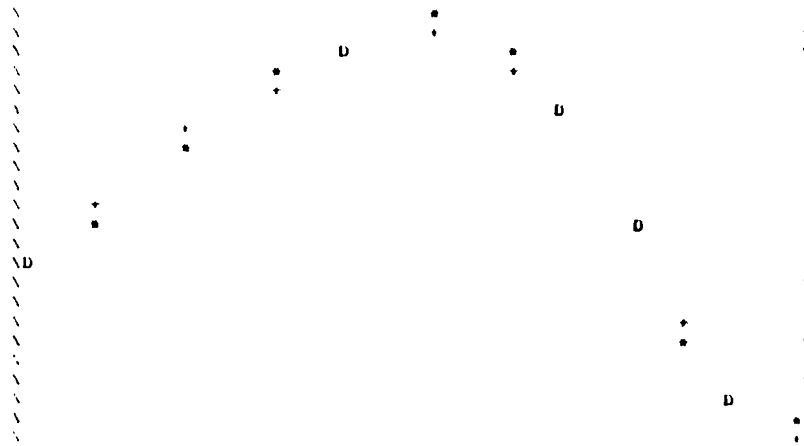
SCHL ARRAY, 11 DATA POINTS, DATA - SDG-ANIM

RMS LOG ERROR = 1.17E-01, ANTILOG YIELDS 30.8030 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.51						
P 2	.03	.5[illegible]					
P 3	.00	.01	.50				
P 4	.00	.00	.01	.00			
T 1	.48	.06	.01	.00	.50		
T 2	.04	.47	.02	.00	.06	.52	
T 3	.00	.01	-.49	.01	.00	.02	.50
	P 1	P 2	P 3	P 4	T 1	T 2	T 3



MODEL: 3 LAYERS

RESISTIVITIES:

5.88E+02 5.46E+04 5.72E+02

THICKNESSES:

1.68E-01 9.46E-01

SPACING	DATA	CALC	% ERROR
6.00E-01	1.82E+03	1.97E+03	-7.724
9.00E-01	2.57E+03	2.89E+03	-10.861
1.50E+00	4.19E+03	4.52E+03	-7.431
2.40E+00	6.43E+03	6.37E+03	1.013
3.60E+00	8.23E+03	7.87E+03	4.538
6.10E+00	1.00E+04	8.48E+03	18.167
9.10E+00	7.73E+03	6.99E+03	10.662
1.21E+01	5.38E+03	5.07E+03	6.192
1.82E+01	2.42E+03	2.38E+03	1.357
2.42E+01	1.07E+03	1.24E+03	-13.170
3.03E+01	7.33E+02	7.98E+02	-8.110
4.55E+01	6.76E+02	5.98E+02	13.055

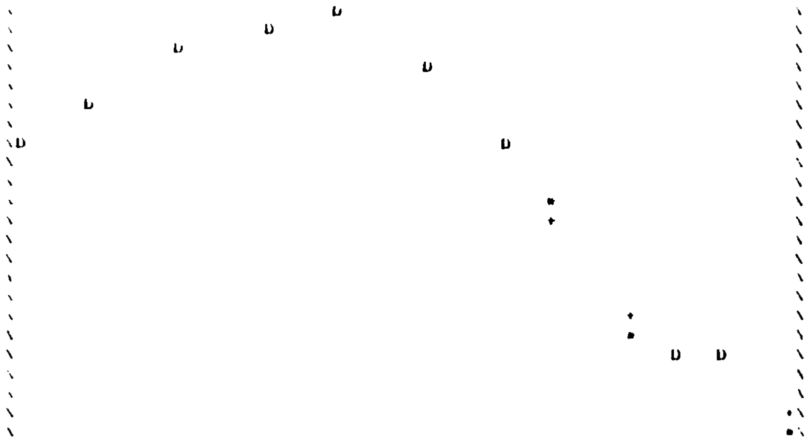
SCHL ARRAY, 12 DATA POINTS, DATA - SDG-ANIM

RMS LOG ERROR = 4.19E-02, ANTILOG YIELDS 10.1328 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.44				
P 2	-.01	.45			
P 3	-.01	.06	.52		
T 1	.44	.00	.04	.45	
T 2	-.03	.45	.06	.02	.45
	P 1	P 2	P 3	T 1	T 2



MODEL: 5 LAYERS
RESISTIVITIES:

3.50E+03	2.56E+04	2.01E+02	8.76E+03	4.91E+01

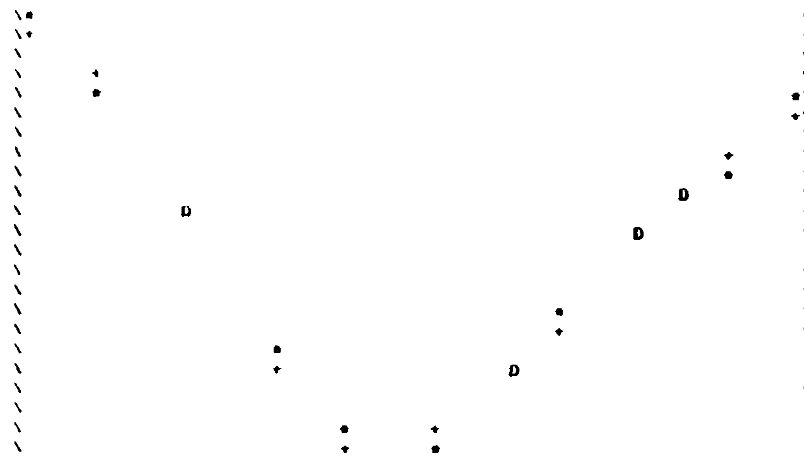
THICKNESSES:

2.99E-01	1.90E+00	1.35E+00	3.54E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	5.47E+03	5.54E+03	1.333
9.00E-01	7.46E+03	7.43E+03	.366
1.50E+00	1.05E+04	1.03E+04	1.857
2.40E+00	1.19E+04	1.26E+04	5.597
3.60E+00	1.40E+04	1.31E+04	6.518
6.10E+00	9.46E+03	9.97E+03	-5.137
9.10E+00	5.64E+03	5.73E+03	-1.592
1.21E+01	3.71E+03	3.32E+03	11.861
1.82E+01	1.49E+03	1.70E+03	-12.243
2.42E+01	1.38E+03	1.40E+03	-1.337
3.03E+01	1.38E+03	1.26E+03	9.663
4.55E+01	7.76E+02	8.38E+02	7.345

SCHL ARRAY, 12 DATA POINTS, DATA = SDG-AF(M
RMS LOG ERROR = 2.94E-02, ANTILOG YIELDS 7.0046 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.94								
P 2	.05	.91							
P 3	.00	-.01	.49						
P 4	.00	.00	.00	.50					
P 5	.00	.02	.03	.04	.05				
T 1	-.07	-.07	.00	.00	.01	.87			
T 2	.05	.10	.02	.00	.03	.09	.90		
T 3	.00	.00	.50	-.02	.03	.00	.01	.50	
T 4	.00	.00	-.02	.50	.05	.00	.00	.00	.50
	P 1	P 2	P 3	P 4	P 5	T 1	T 2	T 3	T 4



MODEL: 4 LAYERS
RESISTIVITIES:

6.22E+02	1.06E+02	1.50E+03	9.67E+01

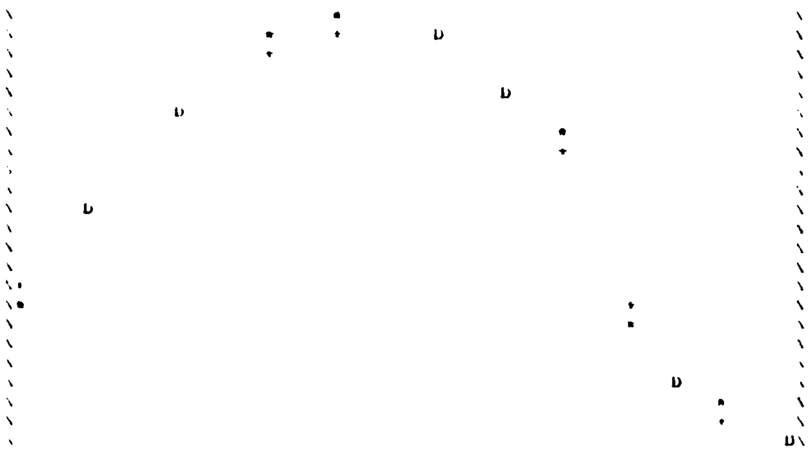
THICKNESSES:

6.26E-01	5.76E+00	1.47E+01

SPACING	DATA	CALC	% ERROR
6.00E-01	5.84E+02	5.59E+02	4.499
9.00E-01	4.50E+02	4.67E+02	-3.726
1.50E+00	2.83E+02	2.92E+02	-3.091
2.40E+00	1.74E+02	1.67E+02	4.041
3.60E+00	1.28E+02	1.26E+02	1.197
6.10E+00	1.23E+02	1.30E+02	-5.216
9.10E+00	1.61E+02	1.58E+02	1.655
1.21E+01	1.97E+02	1.93E+02	1.822
1.82E+01	2.77E+02	2.62E+02	5.611
2.42E+01	3.18E+02	3.17E+02	.236
3.03E+01	3.23E+02	3.59E+02	-10.135
4.55E+01	4.35E+02	4.14E+02	4.963

SCHL ARRAY, 12 DATA POINTS, DATA = SDG-AL(M
RMS LOG ERROR = 2.03E-02, ANTILOG YIELDS 4.7920 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	1.00						
P 2	.00	1.00					
P 3	.00	-.01	.55				
P 4	.00	.01	.05	.03			
T 1	.00	.00	.00	.00	1.00		
T 2	.00	.00	-.04	.01	.00	.99	
T 3	.00	.00	.47	.09	.00	.04	.48
	P 1	P 2	P 3	P 4	T 1	T 2	T 3

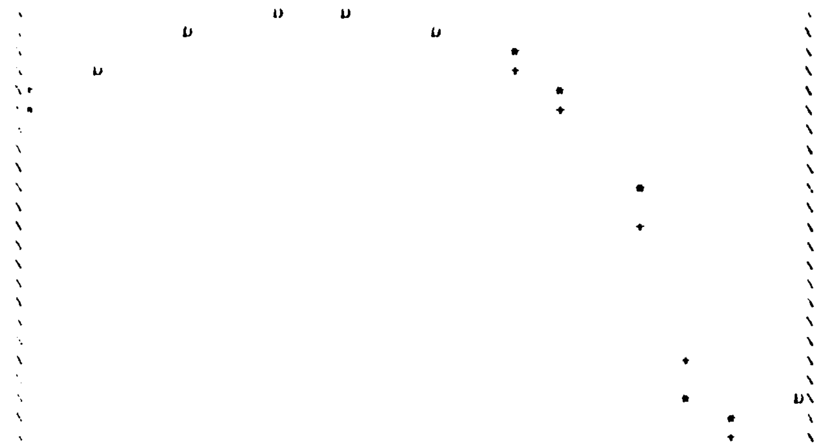


MODEL: 3 LAYERS
RESISTIVITIES:
1.84E+02 3.22E+04 3.49E+02
THICKNESSES:
1.30E-01 4.63E-01

SPACING	DATA	CALC	% ERROR
6.00E-01	7.08E+02	8.00E+02	-11.496
9.00E-01	1.15E+03	1.17E+03	-1.856
1.50E+00	1.79E+03	1.79E+03	-.159
2.40E+00	2.69E+03	2.44E+03	9.922
3.60E+00	3.08E+03	2.90E+03	6.329
6.10E+00	2.88E+03	2.85E+03	.990
9.10E+00	2.02E+03	2.15E+03	-6.083
1.21E+01	1.68E+03	1.48E+03	13.884
1.82E+01	6.36E+02	7.28E+02	-12.594
2.42E+01	4.66E+02	4.71E+02	-1.146
3.03E+01	4.33E+02	3.91E+02	10.799
4.42E+01	3.47E+02	3.62E+02	-4.074

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-A1(M
RMS LOG ERROR - 3.53E-02, ANTILOG YIELDS 8.4753 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

F 1	.69				
F 2	.01	.50			
F 3	.01	.00	1.00		
T 1	.01	.02	.01	.70	
T 2	.00	.50	.00	.00	.50
	F 1	F 2	F 3	T 1	T 2

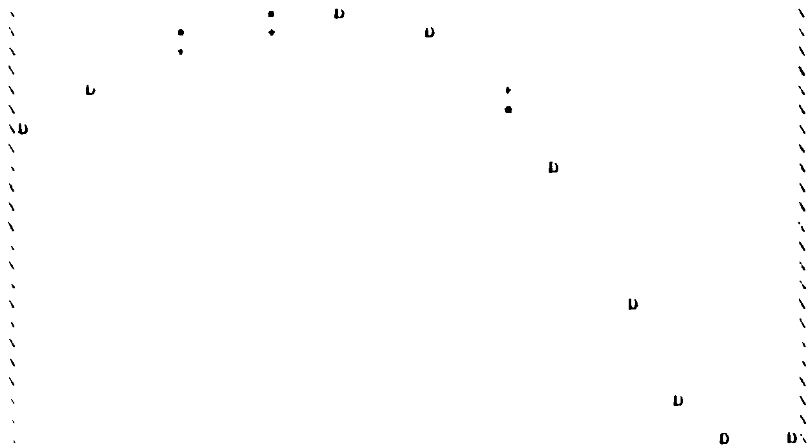


MODEL: 4 LAYERS
RESISTIVITIES:
5.30E+01 4.09E+03 2.87E+00 2.50E+02
THICKNESSES:
7.29E-02 1.17E+00 6.88E+01

SPACING	DATA	CALC	% ERROR
6.00E-01	3.16E+02	3.88E+02	-18.495
9.00E-01	4.80E+02	5.53E+02	-13.248
1.50E+00	8.03E+02	8.12E+02	-1.147
2.40E+00	1.08E+03	1.05E+03	3.269
3.60E+00	1.04E+03	1.14E+03	-8.206
6.10E+00	8.47E+02	9.07E+02	-6.624
9.10E+00	6.34E+02	5.14E+02	23.456
1.21E+01	3.31E+02	2.54E+02	30.082
1.82E+01	8.70E+01	4.89E+01	78.068
2.42E+01	4.00E+00	7.46E+00	-46.404
3.03E+01	3.00E+00	2.39E+00	25.730
4.55E+01	4.00E+00	4.63E+00	-13.579

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-AJ(M
RMS LOG ERROR - 1.24E-01, ANTILOG YIELDS 33.1650 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

F 1	.00						
F 2	.00	.42					
F 3	.00	.00	.34				
F 4	.00	.00	.00	.00			
T 1	.00	.08	.04	.00	.59		
T 2	.00	.43	.03	.00	.16	.46	
T 3	.00	.00	-.04	.00	.00	.00	.00
	F 1	F 2	F 3	F 4	T 1	T 2	T 3



MODEL: 3 LAYERS

RESISTIVITIES:

1.65E+03 1.55E+04 2.22E+02

THICKNESSES:

2.15E-01 2.54E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	3.18E+03	3.65E+03	12.944
9.00E-01	5.07E+03	4.96E+03	2.218
1.50E+00	7.64E+03	6.87E+03	11.265
2.40E+00	9.35E+03	8.48E+03	10.235
3.60E+00	9.09E+03	9.12E+03	-.326
6.10E+00	7.50E+03	7.45E+03	.606
9.10E+00	4.17E+03	4.46E+03	-6.625
1.21E+01	2.24E+03	2.40E+03	-6.771
1.82E+01	6.86E+02	6.82E+02	.659
2.42E+01	3.34E+02	2.96E+02	12.660
3.03E+01	2.30E+02	2.33E+02	-1.111
4.55E+01	2.20E+02	2.39E+02	-7.849

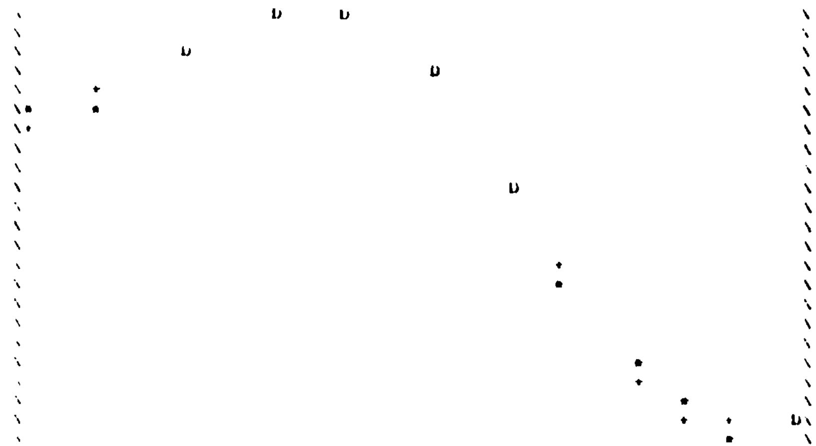
SCHL ARRAY, 12 DATA POINTS, DATA - SDG AEIM

RMS LOG ERROR = 3.35E-02, ANTILOG YIELDS 8.0135 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

F 1	.37				
F 2	.06	.47			
F 3	.00	.01	.59		
T 1	.36	.07	.03	.36	
T 2	.11	.39	.07	.12	.57
	P 1	P 2	P 3	T 1	T 2



MODEL: 4 LAYERS

RESISTIVITIES:

1.71E+03 3.30E+03 3.68E+02 4.16E+02

THICKNESSES:

5.73E-01 2.34E+00 7.80E+01

SPACING	DATA	CALC	% ERROR
6.00E-01	1.46E+03	1.42E+03	2.519
9.00E-01	1.51E+03	1.59E+03	-4.938
1.50E+00	1.94E+03	1.92E+03	.692
2.40E+00	2.27E+03	2.21E+03	2.928
3.60E+00	2.26E+03	2.24E+03	.841
6.10E+00	1.73E+03	1.74E+03	-1.027
9.10E+00	1.10E+03	1.11E+03	-1.242
1.21E+01	7.26E+02	7.39E+02	-1.815
1.82E+01	4.84E+02	4.60E+02	5.232
2.42E+01	4.10E+02	4.00E+02	2.595
3.03E+01	3.61E+02	3.86E+02	-6.439
4.55E+01	3.78E+02	3.78E+02	.006

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-AFIM

RMS LOG ERROR = 1.40E-02, ANTILOG YIELDS 3.2694 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

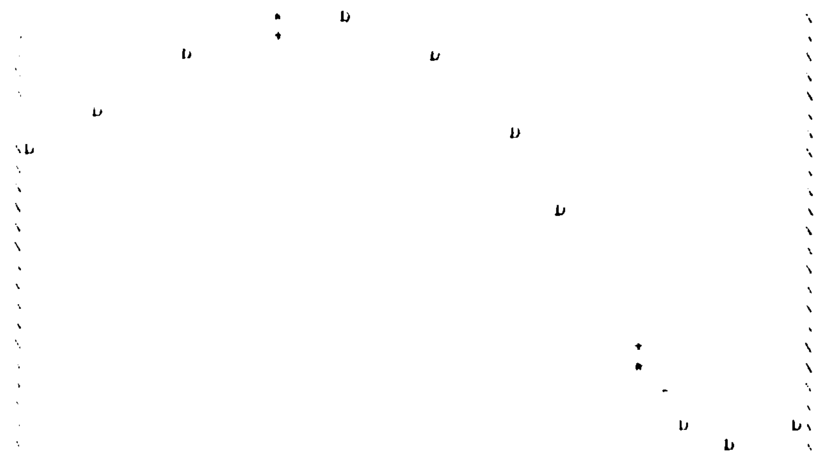
F 1	1.00						
F 2	.01	.97					
F 3	.00	.00	1.00				
F 4	.00	.02	.01	.24			
T 1	.01	.03	.00	.02	.95		
T 2	.01	.03	.00	.03	.04	.96	
T 3	.00	-.02	-.01	-.20	-.02	.03	.17
	P 1	P 2	P 3	P 4	T 1	T 2	T 3

MODEL: 5 LAYERS
RESISTIVITIES:
9.68E+02 7.49E+01 4.22E+00 2.21E+04 1.00E+00
THICKNESSES:
1.02E+00 8.[illegible]E+01 2.55E+00 7.[illegible]E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	8.17E+02	9.61E+02	-14.905
9.00E-01	9.56E+02	9.45E+02	1.11[illegible]
1.50E+00	7.80E+02	8.86E+02	11.481
2.40E+00	8.04E+02	7.26E+02	10.800
3.60E+00	4.70E+02	4.84E+02	[illegible]
6.10E+00	1.84E+02	1.96E+02	6.045
7.10E+00	1.0[illegible]E+02	1.01E+02	[illegible]
1.21E+01	8.4[illegible]E+01	8.26E+01	1.7[illegible]
1.82E+01	[illegible]	7.71E+01	[illegible]
[illegible]	[illegible]	7.81E+01	6.[illegible]
[illegible]	[illegible]	7.70E+01	15.6[illegible]
4.55E+01	7.6[illegible]E+01	7.6[illegible]E+01	.042

SCHL ARRAY, 1[illegible] DATA POINTS, DATA [illegible]
RMS LOG ERROR = 4.[illegible]E-02, ANTILOG YIELDS 9.9978 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	1.00								
P 2	.00	1.00							
P 3	[illegible]	[illegible]	[illegible]						
P 4	[illegible]	[illegible]	.01	.0[illegible]					
P 5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
T 1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.00			
T 2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
T 3	[illegible]	[illegible]	[illegible]	.01	[illegible]	[illegible]	-.27	[illegible]	
T 4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	P 1	P 2	P 3	P 4	P 5	T 1	T 2	T 3	T 4

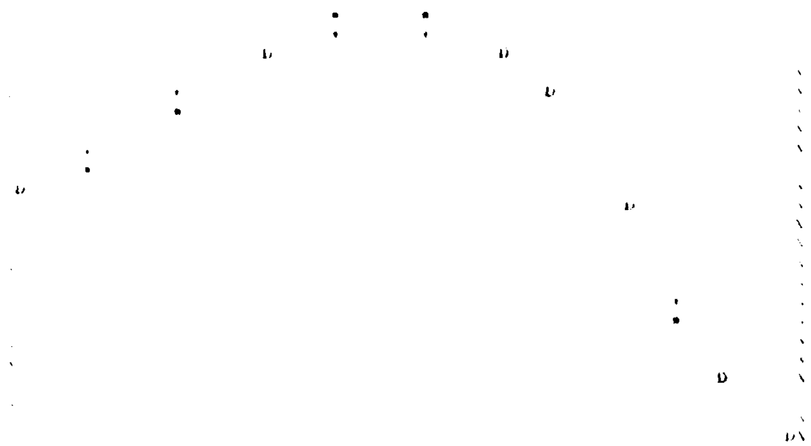


MODEL: 4 LAYERS
RESISTIVITIES:
1.50E+03 2.01E+04 2.28E+02 2.74E+03
THICKNESSES:
2.94E-01 1.54E+00 3.50E+01

SPACING	DATA	CALC	% ERROR
6.00E-01	2.7[illegible]E+03	2.04E+03	-3.773
9.00E-01	3.81E+03	3.92E+03	-2.938
1.50E+00	5.59E+03	5.64E+03	-.914
2.40E+00	7.71E+03	7.15E+03	7.796
3.60E+00	8.29E+03	7.69E+03	7.761
6.10E+00	5.75E+03	6.05E+03	5.037
9.10E+00	3.33E+03	3.45E+03	3.5[illegible]4
1.21E+01	1.85E+03	1.80E+03	2.755
1.82E+01	5.20E+02	5.30E+02	-1.943
2.43E+01	3.02E+02	2.89E+02	4.584
3.03E+01	2.57E+02	2.69E+02	-4.424
4.55E+01	3.24E+02	3.22E+02	.712

SCHL ARRAY, 12 DATA POINTS, DATA SDG-Z(M)
RMS LOG ERROR = 1.90E-02, ANTILOG YIELDS 4.4625 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

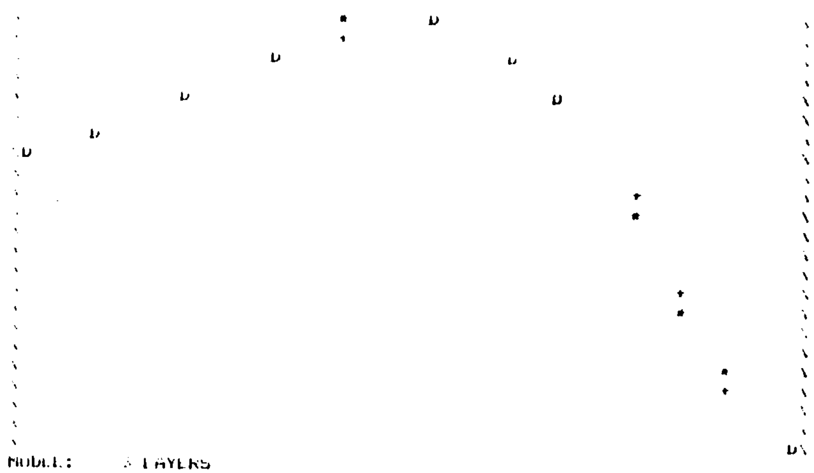
P 1	.58						
P 2	.01	.58					
P 3	.05	.03	.91				
P 4	.01	.00	.03	.01			
T 1	-.43	-.10	.05	-.01	.52		
T 2	.00	.41	.04	-.01	.10	.59	
T 3	.07	-.04	-.16	-.06	.07	.06	.50
	P 1	P 2	P 3	P 4	T 1	T 2	T 3



MODEL: [illegible] LAYERS
RESISTIVITIES:
[illegible] 1.16E+05 4.98E+0[illegible]
THICKNESSES:
[illegible] 7.04E-01

SPACING	DATA	CALC	% ERROR
[illegible]	[illegible]	3.7[illegible]E+02	[illegible]
9.00E-01	4.92E+03	5.14E+03	-7.2[illegible]
1.50E+00	8.0[illegible]E+03	8.[illegible]4E+03	[illegible].800
2.40E+00	1.17E+04	1.17E+04	.057
[illegible].60E+00	1.5[illegible]E+04	1.4[illegible]E+04	8.641
6.10E+00	1.64E+04	1.51E+04	9.034
9.10E+00	1.20E+04	1.20E+04	.20[illegible]
1.[illegible]1E+01	8.[illegible]E+03	8.3[illegible]E+03	1.2[illegible]
1.82E+01	[illegible].59E+03	[illegible].48E+03	[illegible].699
2.42E+01	1.31E+03	1.49E+03	-1[illegible].240
[illegible]E+01	8.61E+02	7.85E+02	9.657
4.55E+01	5.[illegible]E+02	5.15E+02	2.40[illegible]

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-I[illegible]
RMS LOG ERROR = 2.[illegible]E-02, ANTILOG YIELDS [illegible] %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1 .9[illegible]
P 2 .02 .50
P 3 .01 .00 1.00
T 1 .10 .04 .01 .9[illegible]
T 2 .02 .50 .00 .04 .[illegible]
P 1 P 2 P 3 T 1 T 2



MODEL: 3 LAYERS
RESISTIVITIES:
[illegible].53E+03 3.77E+04 3.79E+02
THICKNESSES:
5.12E-01 2.30E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	4.45E+03	4.37E+03	1.997
9.00E-01	5.11E+03	5.59E+03	-8.656
1.50E+00	8.18E+03	8.22E+03	-.508
2.40E+00	1.16E+04	1.13E+04	2.460
[illegible].60E+00	1.44E+04	1.37E+04	5.2[illegible]
6.10E+00	1.50E+04	1.44E+04	4.567
9.10E+00	1.16E+04	1.14E+04	2.018
1.21E+01	7.94E+03	7.90E+03	.524
1.82E+01	2.90E+03	3.22E+03	-10.019
2.42E+01	1.25E+03	1.33E+03	-6.006
[illegible]E+01	7.52E+02	6.49E+02	15.956
4.55E+01	3.68E+02	3.92E+02	-6.203

SCHL ARRAY, 12 DATA POINTS, DATA - SDG-V[illegible]
RMS LOG ERROR = 2.95E-02, ANTILOG YIELDS 7.[illegible]90 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER
P 1 .80
P 2 .03 .56
P 3 .02 .02 .73
T 1 .22 -.13 .02 .70
T 2 .03 .43 .02 .14 .57
P 1 P 2 P 3 T 1 T 2

MODEL: 4 LAYERS

RESISTIVITIES:

1.70E+04	6.57E+02	4.78E+03	1.00E+01

THICKNESSES:

3.06E+00	1.02E+00	6.53E+00

SPACING	DATA	CALC	% ERROR
1.50E+00	1.43E+04	1.66E+04	-14.037
2.40E+00	1.61E+04	1.57E+04	2.600
3.80E+00	1.58E+04	1.37E+04	15.477
6.10E+00	1.04E+04	8.71E+03	18.860
9.10E+00	6.16E+03	5.06E+03	21.734
1.21E+01	2.00E+03	3.48E+03	-42.685
1.82E+01	2.72E+03	2.30E+03	18.353
2.42E+01	2.72E+03	1.64E+03	65.366
3.03E+01	7.55E+02	1.11E+03	-32.103
4.55E+01	3.52E+02	3.49E+02	.991

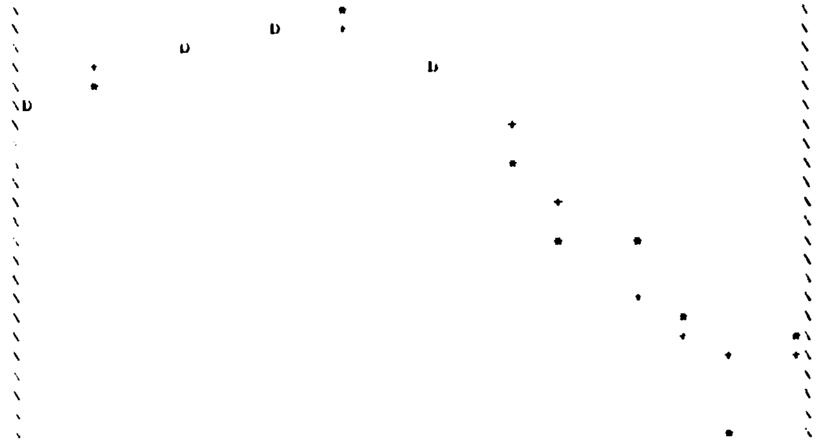
SCHL ARRAY, 10 DATA POINTS, DATA = SDG-O(M)

RMS LOG ERROR = 1.27E-01, ANTILOG YIELDS 33.9412 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

F 1	.00						
P 2	.00	.38					
P 3	.00	.14	.58				
F 4	.00	.00	.00	.00			
T 1	.00	.03	.00	.00	.98		
T 2	.00	.39	.14	.00	-.02	.39	
T 3	.00	.18	.42	.00	.02	.18	.54
	F 1	P 2	P 3	F 4	T 1	T 2	T 3



MODEL: 5 LAYERS

RESISTIVITIES:

2.39E+03	9.25E+03	6.97E+02	1.10E+01	2.00E+04

THICKNESSES:

1.89E-01	3.39E+00	5.50E+01	9.21E+00

SPACING	DATA	CALC	% ERROR
6.00E-01	4.34E+03	4.60E+03	-5.594
9.00E-01	5.44E+03	5.66E+03	-3.991
1.50E+00	7.16E+03	6.87E+03	4.110
2.40E+00	8.41E+03	7.57E+03	11.162
3.60E+00	9.16E+03	7.54E+03	21.518
6.10E+00	5.81E+03	5.93E+03	-2.086
9.10E+00	3.03E+03	3.73E+03	-18.703
1.21E+01	1.75E+03	2.28E+03	-23.528
1.82E+01	1.69E+03	1.08E+03	55.957
2.42E+01	1.00E+03	7.91E+02	26.365
3.03E+01	4.07E+02	7.21E+02	-43.570
4.55E+01	7.76E+02	6.69E+02	15.945

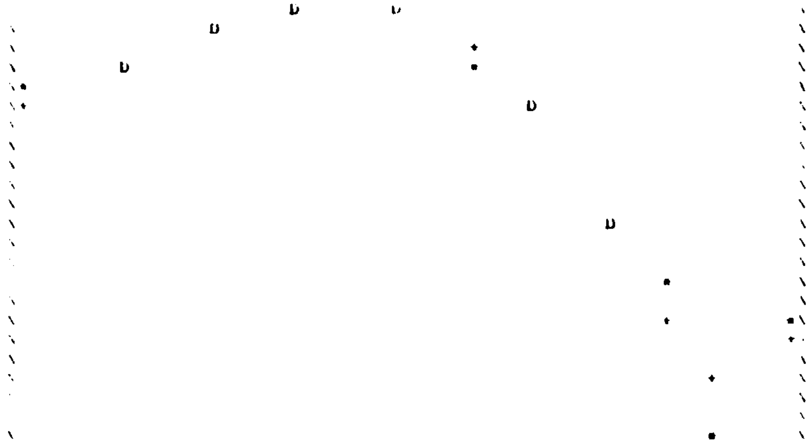
SCHL ARRAY, 12 DATA POINTS, DATA = SDG-P(M)

RMS LOG ERROR = 1.10E-01, ANTILOG YIELDS 28.8829 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.55								
P 2	.00	.96							
P 3	.01	-.01	.97						
P 4	.00	.00	.01	.00					
P 5	.00	.00	.00	.00	.00				
T 1	-.46	-.04	-.01	.00	.00	.42			
T 2	.00	.04	.02	.00	.00	.05	.96		
T 3	-.01	.03	.10	.04	.00	.02	-.05	.43	
T 4	.00	.00	-.01	.00	.00	.00	.00	-.03	.00
	P 1	P 2	P 3	P 4	P 5	T 1	T 2	T 3	T 4



MODEL: 4 LAYERS

RESISTIVITIES:

3.24E+03 1.79E+04 4.47E+01 1.0[illegible]E+05

THICKNESSES:

5.70E-01 [illegible].75E+00 2.70E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	5.97E+03	5.78E+03	3.262
1.50E+00	8.00E+03	8.01E+03	-.214
2.40E+00	1.00E+04	1.01E+04	-1.155
3.60E+00	1.19E+04	1.15E+04	3.0[illegible]5
6.10E+00	1.11E+04	1.12E+04	-1.1[illegible]4
9.10E+00	7.76E+03	8.30E+03	-7.[illegible]16
1.21E+01	5.12E+03	5.51E+03	-7.1[illegible]
1.82E+01	2.24E+03	2.09E+03	6.78[illegible]
2.42E+01	1.[illegible]	9.[illegible]	4.76[illegible]
3.03E+01	[illegible]	6.[illegible]E+02	-[illegible].51[illegible]
4.55E+01	1.0[illegible]E+03	7.89E+02	[illegible]0.299

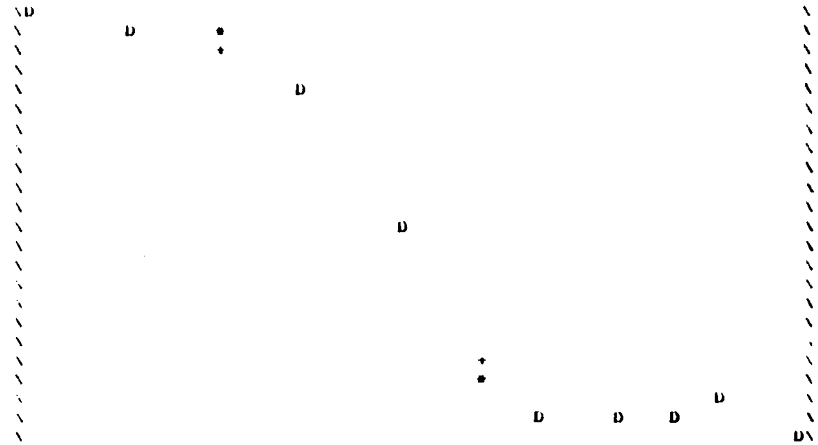
SCHL ARRAY, 11 DATA POINTS, DATA = SDG-F(M)

RMS LOG ERROR = 8.50E-02, ANTILOG YIELDS 21.8[illegible]11 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.[illegible]						
P 2	.00	.50					
P 3	.00	.01	.[illegible]				
P 4	.00	.00	.00	.00			
T 1	[illegible]	.09	.02	.00	.21		
T 2	.12	.[illegible]	.05	.00	.1[illegible]	.61	
T 3	.00	.01	[illegible]	.00	.01	.[illegible]	.[illegible]
	P 1	P [illegible]	P [illegible]	P 4	T 1	T 2	T [illegible]



MODEL: 4 LAYERS

RESISTIVITIES:

1.40E+03 1.64E+02 4.69E+03 5.00E+01

THICKNESSES:

2.55E+00 8.76E+00 1.52E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	1.44E+03	1.39E+03	3.780
1.50E+00	1.38E+03	1.35E+03	2.226
2.40E+00	1.31E+03	1.25E+03	4.690
3.60E+00	1.04E+03	1.03E+03	1.303
6.10E+00	5.98E+02	5.92E+02	.995
9.10E+00	3.21E+02	3.37E+02	-4.875
1.21E+01	2.68E+02	2.59E+02	3.606
1.82E+01	2.58E+02	2.53E+02	2.053
2.42E+01	2.61E+02	2.71E+02	-3.600
3.03E+01	2.77E+02	2.75E+02	.563
4.55E+01	2.44E+02	2.43E+02	.564

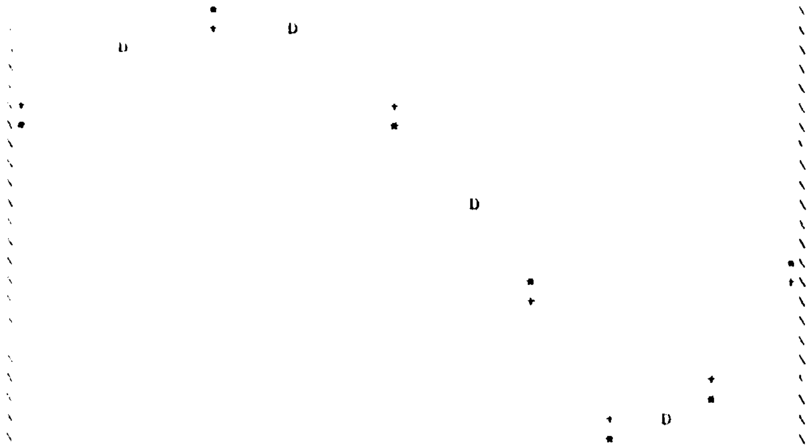
SCHL ARRAY, 11 DATA POINTS, DATA = SDG-1(M)

RMS LOG ERROR = 1.30E-02, ANTILOG YIELDS 3.0300 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

F 1	.00						
P 2	.00	.98					
P 3	.00	.00	.50				
F 4	.00	.00	.00	.00			
T 1	.00	.01	.00	.00	1.00		
T 2	.00	-.03	.00	.00	.01	.95	
T 3	.00	.00	.50	.00	.00	.00	.50
	F 1	P 2	P 3	F 4	T 1	T 2	T 3



MODEL: 5 LAYERS

RESISTIVITIES:

2.00E+02	1.55E+03	6.42E+02	2.00E+01	4.62E+03

THICKNESSES:

1.62E-01	1.24E+00	3.60E+00	2.58E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	6.48E+02	6.80E+02	-4.650
1.50E+00	9.07E+02	8.72E+02	3.981
2.40E+00	1.05E+03	9.75E+02	7.222
3.60E+00	9.36E+02	9.44E+02	-.818
6.10E+00	6.42E+02	7.18E+02	-10.638
9.10E+00	4.75E+02	4.66E+02	1.984
1.21E+01	3.34E+02	3.07E+02	8.888
1.82E+01	1.72E+02	1.89E+02	-8.774
2.42E+01	1.85E+02	1.88E+02	-1.591
3.03E+01	2.10E+02	2.20E+02	-4.731
4.55E+01	3.55E+02	3.21E+02	10.642

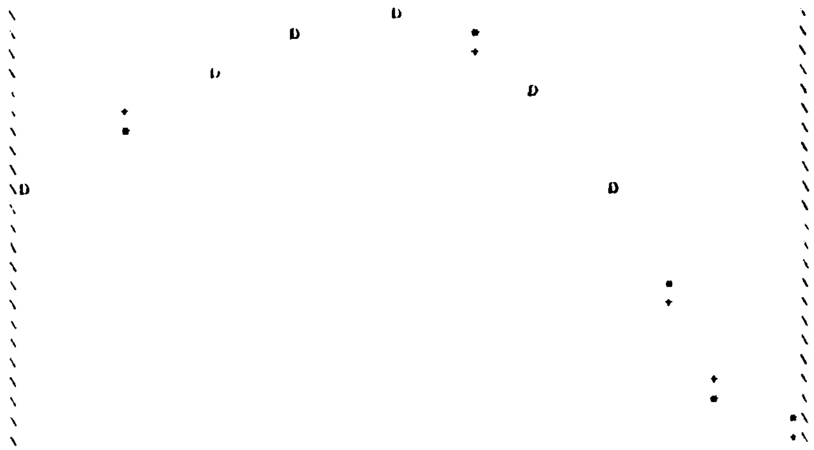
SCHL ARRAY, 11 DATA POINTS, DATA - SDG-I-1

RMS LOG ERROR = 2.94E-02, ANTILOG YIELDS 6.9941 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.00								
P 2	.00	.83							
P 3	.00	.04	.50						
F 4	.00	.00	.00	.00					
P 5	.00	-.01	.02	.00	.02				
T 1	.00	-.13	.05	.00	.00	.87			
T 2	.00	.22	.34	.00	.00	.13	.33		
T 3	.00	-.10	.16	.00	-.03	-.06	.09	.82	
T 4	.00	.00	-.01	.00	-.08	.00	.02	-.01	.98
	P 1	P 2	P 3	F 4	P 5	T 1	T 2	T 3	T 4



MODEL: 3 LAYERS

RESISTIVITIES:

6.90E+02	2.81E+04	3.92E+02

THICKNESSES:

2.31E-01	1.69E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	2.23E+03	2.41E+03	-7.739
1.50E+00	3.63E+03	3.77E+03	-3.782
2.40E+00	5.49E+03	5.34E+03	2.853
3.60E+00	7.01E+03	6.67E+03	4.975
6.10E+00	7.68E+03	7.39E+03	3.882
9.10E+00	6.51E+03	6.28E+03	3.651
1.21E+01	4.50E+03	4.67E+03	-3.625
1.82E+01	2.38E+03	2.23E+03	6.769
2.42E+01	1.17E+03	1.10E+03	5.647
3.03E+01	5.47E+02	6.43E+02	-14.991
4.55E+01	4.44E+02	4.13E+02	7.511

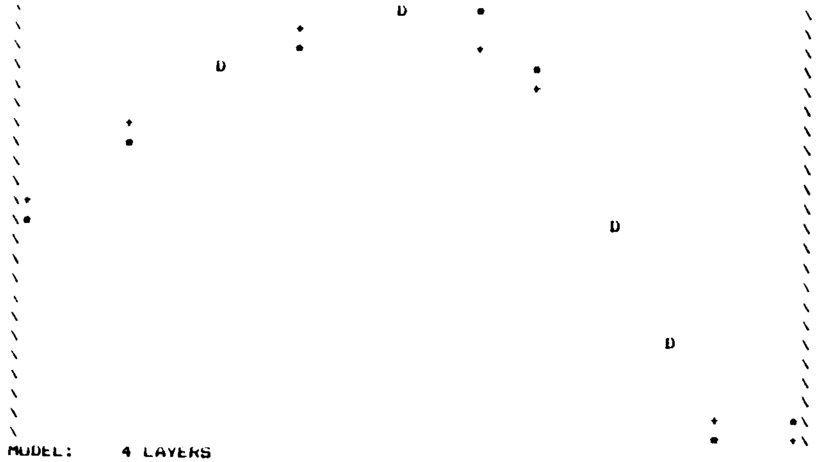
SCHL ARRAY, 11 DATA POINTS, DATA - SDG-J(M)

RMS LOG ERROR = 3.05E-02, ANTILOG YIELDS 7.2686 %

PARAMETER RESOLUTION MATRIX:

"F" MEANS FIXED PARAMETER

P 1	.50				
P 2	.01	.51			
P 3	.03	-.01	.95		
T 1	-.48	-.04	.04	.51	
T 2	-.03	.48	.02	.03	.51
	P 1	P 2	P 3	T 1	T 2

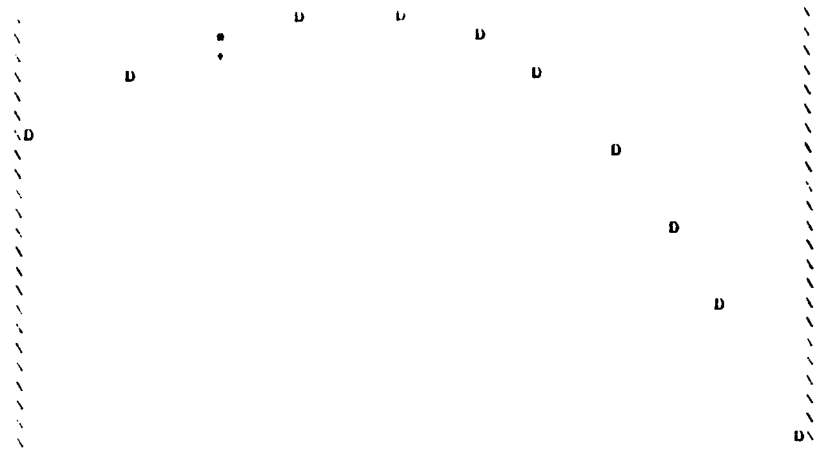


MODEL: 4 LAYERS
RESISTIVITIES:
7.11E+02 5.57E+04 1.26E+02 5.85E+03
THICKNESSES:
1.94E 01 1.17E+00 6.44E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	2.78E+03	3.03E+03	-8.450
1.50E+00	4.50E+03	4.79E+03	-5.975
2.40E+00	6.73E+03	6.84E+03	-1.667
3.60E+00	8.39E+03	8.61E+03	-2.582
6.10E+00	1.01E+04	9.65E+03	4.175
9.10E+00	9.66E+03	8.29E+03	16.521
1.21E+01	6.86E+03	6.17E+03	11.080
1.82E+01	2.83E+03	2.91E+03	-2.638
2.42E+01	1.35E+03	1.42E+03	-4.924
3.03E+01	7.85E+02	8.63E+02	-9.029
4.55E+01	8.48E+02	7.86E+02	7.878

SCHL ARRAY, 11 DATA POINTS, DATA = SDG-E(M)
RMS LOG ERROR = 3.38E-02, ANTILOG YIELDS 8.0930 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

F 1	.00						
P 2	.00	.50					
F 3	.00	.00	.48				
F 4	.00	.00	.00	.00			
T 1	.00	-.02	.01	.00	.98		
T 2	.00	.50	.01	.00	.03	.50	
T 3	.00	.00	-.48	.00	.00	.00	.49
	F 1	P 2	F 3	F 4	T 1	T 2	T 3



MODEL: 5 LAYERS
RESISTIVITIES:
1.72E+03 3.49E+04 2.77E+03 2.97E+02 1.70E+02
THICKNESSES:
2.82E-01 1.91E+00 8.82E+00 3.48E+00

SPACING	DATA	CALC	% ERROR
9.00E-01	4.59E+03	4.73E+03	-3.098
1.50E+00	7.24E+03	7.19E+03	.750
2.40E+00	1.00E+04	9.89E+03	1.309
3.60E+00	1.24E+04	1.20E+04	3.175
6.10E+00	1.27E+04	1.26E+04	.901
9.10E+00	1.03E+04	1.04E+04	-.621
1.21E+01	7.21E+03	7.69E+03	-6.173
1.82E+01	4.07E+03	3.87E+03	5.088
2.42E+01	2.03E+03	1.98E+03	2.417
3.03E+01	1.03E+03	1.06E+03	-3.417
4.55E+01	3.44E+02	3.42E+02	.541

SCHL ARRAY, 11 DATA POINTS, DATA = SDG E(M)
RMS LOG ERROR = 1.35E-02, ANTILOG YIELDS 3.1592 %
PARAMETER RESOLUTION MATRIX:
"F" MEANS FIXED PARAMETER

P 1	.50								
P 2	.02	.56							
P 3	.00	.01	.41						
P 4	.00	.00	.01	.00					
P 5	.00	.03	-.19	.02	.36				
T 1	.49	-.06	.04	.00	-.01	.49			
T 2	-.04	.44	.16	.00	-.02	.03	.49		
T 3	.03	-.04	.21	.05	.25	.02	.00	.84	
T 4	.00	.00	.00	.00	.02	.00	.00	.03	.00
	P 1	P 2	P 3	P 4	P 5	T 1	T 2	T 3	T 4

Appendix G.3

Self Potential Data

SELF POTENTIAL DATA

Reduced self potential data as of April-May, 1985 from each field station at McChord Air Force Base and the American Lake Gardens Tract, Washington are listed on the following pages. All potentials are in millivolts and were reproducible to within 5 millivolts. Tie-line errors were within 10 millivolts. Near surface geologic noise appeared to be about 10 millivolts. All contact resistances were less than 200 kilo-ohms and typically were 50 kilo-ohms. Horizontal control is based upon the following data provided by SAIC/JRB Associates, Bellevue, Washington.

STA = 9-78-A-1	N.	660,786.546
	E.	1,492,201.287
STA = 22-10	N.	660,478.607
	E.	1,491,834.934

Coordinates		BP
E 1500220	N 664950	8
E 1500245	N 664950	4
E 1500270	N 664951	30
E 1500295	N 664951	5
E 1500320	N 664952	12
E 1500345	N 664952	9
E 1500370	N 664953	2
E 1500395	N 664953	7
E 1500420	N 664954	-16
E 1500445	N 664954	9
E 1500470	N 664955	18
E 1500495	N 664955	6
E 1500520	N 664956	-8
E 1500545	N 664956	9
E 1500570	N 664957	2
E 1500595	N 664957	-15
E 1500620	N 664958	-5
E 1500645	N 664958	-7
E 1500670	N 664959	-5
E 1500695	N 664959	-2
E 1500720	N 664960	-7
E 1500745	N 664960	-6
E 1500770	N 664961	3
E 1500795	N 664961	19
E 1500820	N 664962	20
E 1500845	N 664962	-12
E 1500870	N 664962	-4
E 1500895	N 664963	-2
E 1500920	N 664963	-13
E 1500945	N 664964	-11
E 1500970	N 664964	-26
E 1500995	N 664965	-16
E 1501020	N 664965	-23
E 1501045	N 664966	-14
E 1501070	N 664966	-5
E 1501095	N 664967	-3
E 1501120	N 664967	-18
E 1501145	N 664968	-8
E 1501170	N 664968	2
E 1501195	N 664969	-9
E 1501220	N 664969	7
E 1501245	N 664970	-4
E 1501270	N 664970	-3
E 1501295	N 664971	2
E 1501320	N 664971	2
E 1501345	N 664972	-3
E 1501370	N 664972	-6
E 1501395	N 664973	5
E 1501420	N 664973	-17
E 1501445	N 664973	-12

E 1501470	N 664974	-15
E 1501495	N 664974	-15
E 1501520	N 664975	-10
E 1501545	N 664975	8
E 1501570	N 664976	16
E 1501595	N 664976	-4
E 1501620	N 664977	-1
E 1501645	N 664977	1
E 1501670	N 664978	11
E 1501695	N 664978	4
E 1501720	N 664979	-11
E 1501745	N 664979	-1
E 1501770	N 664980	-2
E 1501795	N 664980	-10
E 1501820	N 664981	7
E 1501845	N 664981	4
E 1501870	N 664982	10
E 1501895	N 664982	-10
E 1501920	N 664983	-7
E 1501945	N 664983	-3
E 1501970	N 664984	12
E 1501995	N 664984	11
E 1502005	N 664985	-21
E 1501991	N 664965	0
E 1501980	N 664940	0
E 1501955	N 664895	-5
E 1501910	N 664810	5
E 1501905	N 664775	13
E 1501904	N 664755	12
E 1501903	N 664730	10
E 1501900	N 664690	1
E 1501901	N 664670	-2
E 1501902	N 664645	-36
E 1501902	N 664620	-60
E 1501903	N 664595	-122
E 1501904	N 664590	-144
E 1501905	N 664580	-148
E 1501905	N 664575	-60
E 1501906	N 664570	13
E 1501907	N 664560	8
E 1501908	N 664540	-19
E 1501908	N 664515	-12
E 1501909	N 664490	-3
E 1501910	N 664465	-14
E 1501911	N 664440	-6
E 1501911	N 664415	-3
E 1501912	N 664390	-1
E 1501913	N 664315	0
E 1501914	N 664290	-20
E 1501914	N 664265	-10
E 1501915	N 664239	-12
E 1501916	N 664214	-8

E 1501917	N 664189	-8
E 1501917	N 664164	2
E 1501918	N 664138	12
E 1501919	N 664113	13
E 1501920	N 664088	8
E 1501920	N 664063	6
E 1501921	N 664037	6
E 1501922	N 664012	6
E 1501923	N 663987	4
E 1501923	N 663962	3
E 1501924	N 663936	-2
E 1501925	N 663911	-1
E 1501926	N 663886	6
E 1501926	N 663861	8
E 1501927	N 663835	4
E 1501928	N 663810	1
E 1501929	N 663785	1
E 1501930	N 663755	-4
E 1501932	N 663725	-3
E 1501935	N 663700	-6
E 1501940	N 663780	-8
E 1501941	N 663655	-2
E 1501942	N 663630	-7
E 1501925	N 663620	-8
E 1501900	N 663615	8
E 1501875	N 663612	-6
E 1501850	N 663610	-12
E 1501830	N 663610	-13
E 1501815	N 663610	-11
E 1501795	N 663625	-16
E 1501785	N 663645	-10
E 1501765	N 663660	10
E 1501750	N 663685	-6
E 1501735	N 663700	-32
E 1501715	N 663725	-12
E 1501705	N 663740	-9
E 1501685	N 663760	-14
E 1501670	N 663780	-11
E 1501650	N 663805	19
E 1501640	N 663820	8
E 1501625	N 663835	3
E 1501605	N 663850	-20
E 1501585	N 663865	18
E 1501570	N 663880	-15
E 1501550	N 663895	-18
E 1501530	N 663910	-2
E 1501510	N 663930	-2
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APPENDIX H

CORRESPONDENCE WITH AND GROUNDWATER MONITORING DATA FROM REGULATORY AND OTHER AGENCIES

H.1 - Correspondence with Regulatory and Other Agencies

H.2 - ALGT Groundwater Monitoring Data from U.S. Army and USAF/OEHL

Appendix H.1

Correspondence with Regulatory and Other Agencies

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 62d AIR BASE GROUP (MAC)
McCHORD AIR FORCE BASE, WASHINGTON 98438

REPLY TO ATTN OF: CC

21 FEB 1985

SUBJECT: Meeting of American Lake Gardens (ALG) Task Force, 14 Feb 85, McChord AFB

TO: All Task Force Members

1. The following personnel attended subject meeting:

Jack Sceva, Environmental Protection Agency 442-1641
Robert Poss, Environmental Protection Agency 442-2632
Francis Chapman, Environmental Protection Agency 442-1215
Jane Hedges, Tacoma-Pierce County Health Department 591-6555
Bob James, Department of Social & Health Services 464-7671
Frank Monahan, Washington State Department of Ecology 753-4089
Steve Miller, Fort Lewis, Environmental Office 967-4076
Capt John Driggers, Fort Lewis, Public Affairs 967-4081/5738
Richard McCurdy, Fort Lewis, Legal Office 967-4741
Bill Bailey, U. S. Army Corps of Engineers 764-3711
Tom West, U. S. Army Corps of Engineers 764-6674
Lt Col Edwin Banner III, Bioenvironmental Engineer, HQ MAC 618-256-2306
Andrew Allan, Civil Engineering, HQ MAC 618-256-2133
Maj Dennis Brownley, USAF OEHL 512-536-2158 or 800-821-4528
Emile Baladi, USAF OEHL 512-536-2158 or 800-821-4528
Colonel William P. Martin, Base Commander, McChord AFB 984-2601
Colonel Gary L. Thompson, Deputy Base Commander, McChord AFB 984-2601
Colonel David Williams, Base Civil Engineer, McChord AFB 984-2294
Ernest Frederick, Civil Engineering, McChord AFB 984-2294
Larry Ogawa, Civil Engineering, McChord AFB 984-3801
Ralph Pittman, Civil Engineering, McChord AFB 984-3268
Lt Col Miguel Pereira, Staff Judge Advocate, McChord AFB 984-5293
Colonel Elliott Boisen, Commander USAF Clinic, McChord AFB 984-5586
Capt Dulcie Weisman, Bioenvironmental Engineer, McChord AFB 984-3921

2. Col Martin welcomed the participants. The purpose of this meeting was to make a formal presentation of the work plan for the ALG ground-water contamination study. The Statement of Work (SOW) was finalized on 13 Feb 85 at a technical review session with representatives of the Air Force, Army, and regulatory agencies. Col Martin asked that Task Force members who disagree with the study approach make their positions known at this Task Force meeting.

3. Col Martin introduced Maj Brownley, USAF Occupational and Environmental Health Laboratory (OEHL), Brooks AFB TX, project officer for both the ALG study and the McChord Installation Restoration Program (IRP). Col Martin emphasized that the ALG study is a separate and distinct effort from the McChord IRP.

4. Before discussing the ALG contract, Maj Brownley made a presentation on the IRP management concept. Maj Brownley asked that the regulatory agencies call him or Mr. Baladi at (512) 536-2158, or toll free 800-821-4528, with questions and comments on the McChord IRP.

5. Maj Brownley then discussed the ALG project. The effort will consist of both a records search and confirmation/quantification of ground-water contamination (performed by JRB Associates). The contract start date will be 1 Apr 85. The goal is to finish the study in six months. The SOW was written for maximum flexibility, assuming worst case and no contingencies. Maj Brownley invited the regulatory agencies to call him or Mr. Baladi with questions and comments during the study.

6. At the SOW technical review session on 13 Feb 85, the consensus was to have one person coordinate regulatory agency input during the ALG field study and in the draft report review stage. Mr. Poss has accepted this responsibility. The Air Force will provide "real-time" data to the regulatory agencies and timely responses will be required to avoid delays. Lt Col Banner, Military Airlift Command Bioenvironmental Engineer, emphasized the need for quick turnaround in the draft report review stage.

7. The draft ALG community relations plan was given to Ms. Chapman, EPA Public Affairs, at the meeting. Capt Bradley will have a final plan by 22 Feb 85.

8. The ALG investigative plan, to include the SOW and community relations plan, will be sent to the regulatory agencies and made available to the public.

William P. Martin Jr.

WILLIAM P. MARTIN, JR., Colonel, USAF
Commander

Directorate

TELEPHONE OR VERBAL CONVERSATION RECORD

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

DATE: 2 May 85

SUBJECT OF CONVERSATION: Camp Murray Groundwater and Hazardous Waste Survey

INCOMING CALL

PERSON CALLING	ADDRESS	PHONE NUMBER AND EXTENSION
Sandra Whiting	Camp Murray Environmental Office	964-6200
PERSON CALLED	**OFFICE**	**PHONE NUMBER AND EXTENSION**
Stephen MIller	Ft Lewis Environmental Office	967-4076

OUTGOING CALL

PERSON CALLING	OFFICE	PHONE NUMBER AND EXTENSION
PERSON CALLED	**ADDRESS**	**PHONE NUMBER AND EXTENSION**

SUMMARY OF CONVERSATION:

Sandra said the abandoned well in the middle of the military vehicle parking area at Camp Murray had been sampled by EPA. Water samples from the wells were taken and analyzed by EPA in their own laboratory. The volatile organic scan showed only TCE at 9.2 ppb and an unknown quantity of 1, 2 trans, a breakdown component of TCE. There will also be a priority pollutant scan, but the results will not be known for about 6 weeks. Sandra said there will be a news release about the levels found because the National Guard has been getting a lot of calls ever since the McChord and Fort Lewis issues hit the newspapers. Her call was simply to let us know what the results were before we saw it in the papers.

We also talked about the follow up survey that EPA may push Camp Murray to perform to find out what has been used there that may have led to ground or surface water pollution. Sandra said that the National Guard receives both state and federal funds, so there is a problem getting either one to commit funds for a hazardous material/waste historical report, inventory and sampling program to show what has and is going on. I again said she should try to tap the Dept of Ecology for help because both DOE and Camp Murray are supposedly state agencies. She said she is pursuing that possibility and will keep me posted.

Stephen P. Miller

STEPHEN P. MILLER
C, ENV OFC
DEH, FLW

DA FORM 1 APR 66 751 REPLACES EDITION OF 1 FEB 58 WHICH WILL BE USED

☆U.S.GPO 1981-0-765-042/1036

AMERICAN LAKE GARDENS TECHNICAL UPDATE - 6 Jun 85

A. Purpose and Scope

B. Administrative Update

1. 28 Feb - Contract award
2. 1 Apr - Second contract award
3. Contract modifications
4. Schedule

C. Technical Update

1. Records Search
2. Geophysical Techniques
    a. Self-potential: 58,800 ft
    b. Seismic refraction: 24,400 ft (90 arrays)
    c. Electrical resistance soundings: 40
    d. Current status
3. Soil Gas Analyses - confirmation tool
4. Wells
    a. Nine constructed
    b. Nine proposed locations & four future locations
5. Sampling
    a. Nine houses & 16 wells sampled
    b. Discuss multiple-level screening
6. Pump Tests
    a. Deletion
    b. Redirect money (increase geophysical & more samples - new source?)
7. Deep Wells
    a. Deletion
    b. Redirect money - about 13 additional shallow wells & associated sample

D. Problems - easements & Mary Clark access

WE NEED YOUR HELP...

IN AN EFFORT TO BETTER SERVE YOU, THE PUBLIC AFFAIRS OFFICE AT MCCHORD AIR FORCE BASE IS SEEKING INFORMATION ABOUT YOUR INDIVIDUAL CONCERNS IN THE AMERICAN LAKE GARDENS AREA.

IN PREVIOUS TOWN HALL MEETINGS WE HAVE IDENTIFIED AND DISCUSSED: HEALTH ISSUES, PROPERTY VALUES, PROGRESS OF REMEDIAL ACTIONS, INTERPERTATION OF WELL SAMPLING AND ALTERNATE WATER SUPPLIES. DO YOU HAVE ANY FURTHER QUESTIONS REGUARDING THESE ISSUES?

ARE THERE ANY OTHER SPECIFIC COMMENTS OR CONCERNS YOU WOULD LIKE TO DISCUSS FURTHER IN MORE DETAIL?

OTHER COMMENTS

WE WILL NEED YOUR NAME, PHONE NUMBER AND ADDRESS SO THAT WE CAN RESPOND TO YOUR QUESTIONS.

NAME ADDRESS

PHONE NUMBER

THANK YOU FOR ASSISTING US SO THAT WE MAY ADDRESS ALL OF YOUR CONCERNS. IF YOU HAVE ANY QUESTIONS PLEASE CALL THE PUBLIC AFFAIRS OFFICE AT (206) 984-5637.

PLEASE RETURN THIS FORM TO: 62nd MAW PUBLIC AFFAIRS OFFICE
MCCHORD AFB, WA. 98438-5000

DEPARTMENT OF THE ARMY
HEADQUARTERS, I CORPS AND FORT LEWIS
FORT LEWIS, WASHINGTON 98433-5000

June 21, 1985

REPLY TO ATTENTION OF:

AFZH-GC

SUBJECT: Well Contamination in Tillicum

Colonel William P. Martin, Jr.
62 Air Base Group/CC
McChord AFB, WA 98438

1. Conversations early this year among members of the American Lake Gardens Task Force and Fort Lewis led to the conclusion that wells in Tillicum should be analyzed for trichloroethylene (TCE) contamination. The regional groundwater flow was thought to be generally toward American Lake from the east. Because TCE had been found in wells east of Tillicum, there was a question whether it might also show up in the Tillicum wells. Fort Lewis received information from the Lakewood Water District that only three private residences were on individual wells used for drinking water rather than being hooked up to the central water supply system. After being given authorization by the Department of the Army to sample off the installation, Fort Lewis asked the Tacoma-Pierce County Health Department to obtain water samples from the three residences and from the Lakewood Water District well in Tillicum. The samples were taken to the Laucks Testing Laboratory in Seattle and analyzed through an existing contract with the Army. Although the Lakewood well was clean, all three residences showed TCE or 1, 2-trans-dichloroethylene contamination. A copy of the results is attached.

2. Investigations will continue to attempt to identify the source or sources of contamination in and around American Lake Gardens. Preliminary data shows higher levels of TCE in the contaminated Tillicum wells than in the monitoring wells installed near Interstate Highway 5 east and southeast of Tillicum. Request that this be discussed at the next meeting of the American Lake Gardens Task Force.

Frederick L. Wilmoth

FREDERICK L. WILMOTH
Colonel, Armor
Garrison Commander

2 Encl
1. Lab results
2. Map

Laucks Testing Laboratories, Inc.

Certificate

940 South Harney St. Seattle, Washington 98108 (206)767-5060

Chemistry, Microbiology, and Technical Services

CLIENT: Commander, I Corps and Ft. Lewis
AFZH-EHQ
ATTN: Randall W. Hanna
Ft. Lewis, WA 98433

LABORATORY NO. 89692

DATE: June 7, 1985

Contract 67-85-D-0003

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 5-8-85 and identified as shown below:

1) 1 Lakewood/Tillicum S. Marek 5/8/85 9:30 J. Hedges
2) 2 Lambertsen 14618 Grant Ave. SW Marek 5/8/85 9:50 J. Hedges
3) 3 Schiller 15521 Portland Ave.
4) G. Ward 8902 Rose Rd. Marek 5/8/85 10:10 J. Hedges

TESTS PERFORMED AND RESULTS:

Analysis by Gas Chromatography

	parts per billion (ug/L)			
	1	2	3	4
Trichloroethylene	<2.	41.	<2.	21.
1,2-cis-Dichloroethylene	<2.	<2.	<2.	<2.
1,2-trans-Dichloroethylene	<2.	54.	8.2	2.6

Key

< indicates "less than"

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

J. M. Owens

JMO:rtv

EPA Region X Lab Management System
*** Lab Analysis Report ***

==> Transaction #: 07261357

--> Group: (54) Purge Halocarbon Scan (GC

Instrument: (GCHP-HAL) Hewlett Packard GC; Hall Detector

Method: (EP2-601) Purgeable Halocarbons, GC Purge and Trap

Chemist: (NJM) Malues, Nick Hours Worked:

Project: DOE-040A AMERICAN LAKE GARDENS/MARY CLARK Prg Ele#: GB10P
SEPTIC TANK WASTEWATER

Prj Off: Wash-DOE Analysis Due: 840615 Revised Due:

*** Sample Records in Transaction ***

Parameter Form File: PURGWAT3 Title: Purgeable Halocarbons - Water Media

Seq#	Sample #	Date/Time	Description
01	8424560	840614	AMER. LK. GARD/MARY CLARK/BOTTOM OF TANK
02	8424561	840614	AMER. LK. GARD/MARY CLARK/MIDDLE OF TANK

Sample Id:	84 24560	84 24[illegible]
Matrix:	Water-Tot	Water-Tot
Units:	ug/l	ug/l
% Slds:		
QA Code:		
Date Extract:	840629	840629
Date Analyzd:	840702	840702
1 Chloroform	5.U	5.U
2 Dichlorobromomethane	5.U	5.U
3 Chlorodibromomethane	5.U	5.U
4 Bromoform	5.U	5.U
5 Chlorobromo Int Std Mes	24. /120%	22. /110%
6 Carbon tetrachloride	5.U	5.U
7 Chlorobenzene	5.U	5.U
8 1,1-Dichloroethane	5.U	5.U
9 1,2-Dichloroethane	5.U	5.U
10 1,1-Dichloroethene	5.U	5.U
11 1,2-(trans)-Dichloroethene	26.	30.
12 1,2-Dichloropropane	5.U	5.U
13 Methylene chloride	5.U	5.U
14 Tetrachloroethene	5.U	5.U
15 1,1,1-Trichloroethane	5.U	5.U
16 1,1,2-Trichloroethane	5.U	5.U
17 Trichloroethene	10.	9.7

Record Type: TRNIN1 Date Verified: 84/08/06 By: Degaugh, Terri
Transaction Status: Verified Transaction...Ready to release.
*** Verified and Transferred to VERTRANS ***
Processed: 16-AUG-84 07:53:14 Status: V Batch: A

LABORATORY ANALYSIS REPORT AND RECORD (General)	DATE 28 Jun 84
TO:	FROM: USAF OEHL/SA Brooks AFB TX 78235
SAMPLE IDENTITY WATER	DATE RECEIVED 22 Jun 84
SAMPLE FROM Mary Clark Septic System (middle of Tank)	LAB CONTROL NR
TEST FOR VOLATILE HALOCARBONS	

METHODOLOGY: EPA METHOD 601

OEHL #	34930	34931	DET.
BASE #	GN840238	GN840239	LIMIT
trans-1,2-DICHLOROETHENE	ND	ND	0.1
TETRACHLOROETHYLENE	ND	ND	0.1
1,1,1-TRICHLOROETHANE	ND	ND	0.1
TRICHLOROETHYLENE	0.8	ND	0.1

Results in Micrograms per Liter
ND - None detected. Less than the detection limit.
Trace - Present but less than the quantitative limit.

LEROY P. GEORGE
Chief, Trace Organics Section

REQUESTING AGENCY (Mailing Address)

USAF CLINIC/SGPB
McCHORD AFB WA 98438

AMD FORM SEP 82 641 REPLACES OEHL FORM 7, DEC 78, WHICH IS OBSOLETE.

TACOMA-PIERCE COUNTY HEALTH DEPARTMENT
MEMORANDUM

To: Major R. Binovi
USAF Clinic/SGPM
McChord Air Force Base, WA. 98438

From: Jane Hedges, R.S.
Senior Environmental Health Specialist
Environmental Health Divison

Subject: SAMPLING RESULTS
AMERICAN LAKE GARDENS AREA

Date: March 16, 1984

Below please find a listing of the bacteriological samples collected and analyzed by Tacoma-Pierce County Health Department Laboratory.

Samples were collected for fecal coliform analysis on the majority of sites and none were detected. The results noted below are total coliform.

We have attached copies of the chemical and organic results.

Bacteriological Samples

	NAME	ADDRESS	DATE SAMPLED	RESULTS
1.	Mary Clark	6117 - 146th St. S.W.	2-1-83	South well TNTC* North well TNTC
	"	"	2-3-83	South well 3/5 tubes North well 0/5 tubes
	"	"	2-15-83	0/100ml (both wells)
	"	"	3-29-84	South well 9.2 North well 2.2
	"	"	4-4-83	South well 2/5 tubes North well 0/5 tubes
	"	"	9-19-83	Checked for iron bact.- no iron bac
2.	Vic Lung	6411 - 146th St. S.W.	4-27-83	Confluent growth
	"	"	5-2-83	0
	"	"	5-11-83	0

	NAME	ADDRESS	DATE SAMPLED	RESULTS
3.	Bobbitt	6508 - 146th St. S.W.	4-27-83	0
4.	Edwin Noyd	6511 - 146th St. S.W.	4-27-83 5-12-83	0 0
5.	Liotta Water System	6625 - 146th St. S.W.	4-27-83 5-2-83 5-11-83	TNTC 0 0
6.	E. M. Miller	14511 Woodbrook Drive	4-27-83 5-2-83 5-11-83	TNTC 1 0
7.	Alpine Estates	6622 - 146th St. S.W.	4-27-83	0
8.	Mirage Apts.	6503 - 150th St. S.W.	4-27-83	0 fecal onl
9.	Hamilton	6108 - 150th St.	5-31-83	0
0.	Brookwood Stables	6420 - 150th St. S.W.	5-31-83	0
1.	Elm Smith	6606 - 146th St. S.W.	5-31-83	0
2.	Bob's Mobile Home Park	7109 - 146th St. S.W. (without chlorinator on)	5-31-83	2
3.	Violet Johnson	6607 - 146th St. S.W.	4-27-83 5-2-83 5-11-83	TNTC 0 0
4.	Private residence	14811 Woodbrook Drive	1-31-84	0

TNTC - Too numerous to count

Appendix H.2

ALGT Groundwater Monitoring Data from U.S. Army and USAF/OEHL

Table I. Analysis of groundwater samples taken from wells at or near the Logistics Center Fort Lewis, Washington 5 August to 9 August 1985.

Well Identification	TCE (ppb)	t-DCE (ppb)
LC-1	<1	<2
LC-2	<1	<2
LC-3	5	<2
LC-4[a]	22	<2
LC-5[a]	190	<2
LC-6[a]	280	<2
LC-7	1	<2
LC-8	2	<2
LC-9	<1	<2
LC-10	400	<2
LC-11	2	<2
LC-12	6	<2
LC-13	2	<2
LC-14	1	400
LC-15	1	<2
LC-16	16	<2
LC-17	30	<2
LC-18	70	<2
LC-19	230	<2
LC-19A	440	<2
LC-19B	320	7
LC-20	2	<2
LC-21	5	<2
LC-22	<1	7
LC-23	5	<2
LC-24	4	<2
LC-25	140	<2
LC-26	<1	<2
LC-27	33	<2
LC-28	<1	200

a-signifies that the result is an average value

Table II. Analysis of ground water samples taken from wells at the Logistics Center, Fort Lewis, Washington for quality assurance purposes.

Well	Description of Sample	TCE (ppb)	t-DCE (ppb)
LC-4	Unpurged	15	<2
LC-4	Replicate	21	<2
LC-4	Replicate	22	<2
LC-4	Replicate	22	<2
LC-4	Siphon transfer from bailer to sample vial	22	<2
LC-4	Double purge	24	<2
LC-5	Replicate	200	<2
LC-5	Replicate	180	<2
LC-5	Siphon transfer from bailer to sample vial	200	<2
LC-6	Replicate	280	<2
LC-6	Replicate	270	<2
LC-11	Normal purge	2	<2
LC-11	Double purge	2	<2
LC-25	Normal purge	140	<2
LC-25	Double purge	140	<2
Field Blank		<1	<2
Transport Blank		<1	<2

BACTERIOLOGICAL ANALYSES OF DRINKING WATER IN THE AMERICAN LAKE GARDEN TRACT*

Date	Home Address	Sample Location	MF Coliform Per 100 ml
21 May 84	14511 Woodbrook	Well House	0
	6607 - 146th St. S.W.	Well House	0
	6511 - 146th St. S.W.	Outside Tap	0
	6622 - 146th St. S.W.	Well House	0
	6625 - 146th St. S.W.	Well House	0
	6117 - 146th St. S.W.	Well House (South)	0
	7903 - 150th St. S.W.	Well House	0
	6411 - 146th St. S.W.	Well House	0
26 Nov 84	6411 - 146th St. S.W.	Outside Tap	0
	6607 - 146th St. S.W.	Well House	0
	6625 - 146th St. S.W.	Outside Tap	0
	6117 - 146th St. S.W.	Kitchen Tap	0
	6511 - 146th St. S.W.	Outside Tap	0

*All samples collected by McChord AFB Clinic/SGPB personnel in cooperation with DSHS and TPCHD.

BACTERIOLOGICAL ANALYSES OF McCHORD AFB WATER SUPPLY WELLS*
(February 1983 - December 1984)

Date	Location	Coliform Per 100 ml
01 Feb 83	South End Housing Area	0
22 Feb 83	Golf Course	0
22 Feb 83	Gingko Housing Area	0
08 Feb 83	Mars Station	0
22 Feb 83	Mars Station	0
15 Mar 83	South End Housing Area	0
15 Mar 83	Mars Station	0
22 Mar 83	Gingko Housing	0
22 Mar 83	Golf Course	0
05 Apr 83	Mars Station	0
19 Apr 83	South End Housing Area	0
29 Apr 83	Carter Lake School	0
03 May 83	Mars Station	0
03 May 83	Gingko Housing	0
17 May 83	South End Housing Area	0
24 May 83	Golf Course	0
04 Jan 84	South End Housing Area	0
09 Jan 84	Mars Station	0
31 Jan 84	Mars Station	0
24 Jan 84	Golf Course	0
14 Feb 84	South End Housing Area	0
21 Feb 84	Golf Course	0
21 Feb 84	Mars Station	0
28 Feb 84	South End Housing Area	0
13 Mar 84	Gingko Housing	0
20 Mar 84	Mars Station	0
20 Mar 84	Golf Course	0
27 Mar 84	South End Housing Area	0
03 Apr 84	Mars Station	0
10 Apr 84	Gingko Housing	0
18 Apr 84	South End Housing Area	0
18 Apr 84	Golf Course	0
24 Apr 84	Mars Hill	0
01 May 84	Gingko Housing	0
08 May 84	Golf Course	0
16 May 84	South End Housing Area	0
06 Nov 84	Mars Hill	0
06 Nov 84	South End Housing Area	0
13 Nov 84	Golf Course	0
20 Nov 84	Gingko Housing	0
04 Dec 84	Mars Station	0
04 Dec 84	South End Housing Area	0

*All samples collected by McChord AFB Clinic/SGPB personnel and analyses performed by USAF/OEHL.

USAF/OEHL QUARTERLY MONITORING RESULTS OF DOMESTIC WATER SUPPLIES IN THE ALGT

6117 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	14	5.7
8/28-9, '84	13.5	9.2
10/23, '84	/	/
11/27, '84	No Results	
1/30, '85	3.3	1.2
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	/	/

6502 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

6411 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	6.5	0.1
8/28-9, '84	2.7	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	5.0	0.2
2/20, '85	/	/
4/8-9, '85	6.2	0.3
4/23, '85	/	/

6504 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

6419 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	14.1	7.9
4/23, '85	/	/

6507 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	17	7.7
8/28-9, '84	12.4	8.9
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	16.5	9.2

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

6511 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	2.3	ND
8/28-9, '84	0.3	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	Tr.	ND
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	1.7	ND

6622 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	0.6
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4-8-9, '85	ND	0.6
4/23, '85	/	/

6606 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

6715 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	8.0	0.2
8/28-9, '84	3.0	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4/8-9, '85	7.1	0.2
4/23, '85	/	/

6607 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	15	3.5
8/28-9, '84	5.9	1.5
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	2.4	0.5
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	/	/

6902 - 146th St. S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

7008 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	0.5
4/23, '85	/	/

7222 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7109 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	0.4
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	0.5
4/23, '85	/	/

7305 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	0.4
4/23, '85	/	/

7203 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

7320 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	ND	ND

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

7408 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

7715 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	ND	ND

7515 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	/	/

7824 - 148th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	ND	0.4
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	ND	2.0
4/23, '85	/	/

7601 - 146th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7902 - 146th St. S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

7909 - 146th St. S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

5818 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	0.1
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4/8-9, '85	ND	0.2
4/23, '85	/	/

7812 - 148th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	ND	Tr.
4/8-9, '85	/	/
4/23, '85	ND	0.3

5908 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7910 - 148th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	0.1	26.0
8/28-9, '84	ND	0.2
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	0.9

5918 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

6004 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

6420 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4/8-9, '85	2.2	2.0
4/23, '85	/	/

6108 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	0.1
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

6503 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

6411 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	0.1
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

6718 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	2.1	1.9
4/23, '85	/	/

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

6821 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	Tr.
4/23, '85	/	/

7129 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	1.7
4/23, '85 - dup.	ND	ND

6824 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7212 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	Tr.
4/23, '85	/	/

6925 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7310 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

7317 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	1.3	1.0

7324 - 150th S.W.

Date	1,2 Trans	TCE
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

7320 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7325 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

7321 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	ND
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	ND	ND
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7411 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	ND	ND

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

7415 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

7822 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	0.9	16.7

7523 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

7903 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	ND	5.6
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	ND	0.3
2/20, '85	/	/
4/8-9, '85	0.7	9.2
4/23, '85	/	/

7819 - 150th S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	0.4	8.0

7912 - 150th S.W.

Date	1,2 Trans	TCE
8/28-9, '84	ND	ND
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	Tr.	0.9
4/23, '85	/	/

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

14607 Murray Road

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	0.3
4/23, '85	/	/

14608 Spring

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	ND	ND

14817 Murray Ave. S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	ND	2.1
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	ND	0.2
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	Tr.	4.2

14711 Spring

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

14919 Murray St.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	Tr.	2.1
4/23, '85	/	/

14920 Spring St. S.W.

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	No Results	
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

USAF/OEHL QUARTERLY MONITORING RESULTS OF
DOMESTIC WATER SUPPLIES IN THE ALGT
(cont'd)

14421 Woodbrook

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	9.4	ND
4/23, '85	/	/

14714 Woodbrook

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	0.3
4/23, '85	/	/

14511 Woodbrook S.W.

Date	1,2 Trans	TCE
5/21-2, '84	ND	0.5
8/28-9, '84	ND	ND
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	NC	NC
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

15020 Woodbrook

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	/	/
1/28-9, '85	/	/
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

14618 Woodbrook

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	/	/
4/23, '85	0.9	ND

15112 Woodbrook

Date	1,2 Trans	TCE
5/21-2, '84	/	/
8/28-9, '84	/	/
10/23, '84	/	/
11/27, '84	No Results	
1/28-9, '85	No Results	
2/20, '85	/	/
4/8-9, '85	ND	ND
4/23, '85	/	/

Legend

/ - No Sample
ND - None Detected
Tr. - Trace
NC - Not Confirmed
No Results - Sample exceeded holding time

APPENDIX I

CHAIN OF CUSTODY

FIELD SAMPLE CUSTODY

Chain of custody procedures were employed with all collected groundwater samples in the project. An example of the chain of custody form currently being used by SAIC is shown in Figure I-1. An example of a completed chain of custody form used on this project is presented in Figure I-2. The procedures are straight forward and follow common sense rules. A brief summary of the salient features is presented below.

When the sample was initially taken, it was logged, identified, and labeled. This included at least the site, depth of sample, sample type, date, time, and sampling person. The field sampling person has primary responsibility for proper maintenance of the sample in the field. When the samples were shipped to the laboratory, SAIC prepared and packed all samples in ice, sealed the coolers, and transferred the samples to the airline freight forwarding company. Signatures of the freight personnel at each shipping or transfer point were required. When the samples arrived at the lab, designated personnel received the samples, asked the delivery person for a sign off on the condition of the shipment, and then began the preparation process for each sample until analysis. Upon receipt at the lab all samples were logged into the laboratory chain of custody and tracking system.

Once the samples have been analyzed, any remaining unanalyzed sample aliquots are kept in the laboratory tracking system until the end of the project. Final extracts or solutions used in the analytical process are also logged into the tracking system and stored in controlled access freezers and coolers throughout the life of the project. At the end of the project, SAIC will seek instructions from the USAF on the final disposition of the samples. If after 120 days from the end date of the project instructions have not been received, SAIC will direct the laboratory to dispose of the samples in an appropriate manner.

SAIC Science Applications International Corporation	SAMPLE CHAIN OF CUSTODY LOG	Shipment No. ________
Project:	Reason for Transfer:	

	Sampling Date	Start Time	Sample Location	Sample ID	R-Rep B-Blk S-Sam	Matrix / Media	# Items or Containers	Comments
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Column Total:								

Signature & Affiliation PLEASE			
Relinquished by / Affiliation:	Received by / Affiliation:	Date / Time:	Condition:
Relinquished by / Affiliation:	Received by / Affiliation:	Date / Time:	Condition:
Relinquished by / Affiliation:	Received by / Affiliation:	Date / Time:	Condition:
Relinquished by / Affiliation:	Received by / Affiliation:	Date / Time:	Condition:

SAIC / ETG 13400-B Northup Way, Suite 38, Bellevue, Washington 98005 (206) 747-7899

Figure I-1

Page ________ of ________

White - Return to Original Sampler (above address)
Yellow - Laboratory Record
Pink - Retained by Original Sampler

SAIC Science Applications International Corporation

SAMPLE CHAIN OF CUSTODY LOG

Shipment No. 2 - Page 1

Project: /Amer. Lake Gardens

Reason for Transfer: Analysis

	Sampling Date	Start Time	Station ID	Station No.	SEQ No.	R-Rep B-Blk S-Sam	Matrix/Media	# Items/ Containers	Remarks
1	6/11/85		6B	38			Water	2	EPA-601/602
2	6/11/85		8B	32				2	
3	6/11/85		6A	52				2	
4	6/11/85		8A	46				2	
5	6/11/85		6A	52		QC		2	
6	6/11/85		7B	32				2	
7	6/11/85		4A	117				2	
8	6/11/85		7A	60				2	
9	6/11/85		4C	35				2	
10	6/11/85		4B	74				2	
11	6/11/85		5	43				2	
12	6/10/85		AZ09	28				2	
13	6/10/85		DZ10	63				2	
14	6/10/85		DZ10	13				2	
15	6/10/85		DZ11	33				2	
16	6/10/85		AZ09	58				2	
17	6/10/85		DZ09	53				2	
18	6/10/85		DZ12	73				2	
19	6/10/85		DZ09	13				2	
20	6/10/85		AZ08	38				2	
Column Total:								40	

Signature/Affiliation PLEASE

Relinquished by:	Shipping Method:	Date/Time:	Condition
Donald Weston	Emery	6/11/85 6 pm	good
Received by Courier: TIME	**Received by Shipping Company:**	**Date/Time:**	**Condition**
M A LaGrandeur 1810	Emery	11 June/1800	Good
Courier from Shipping Company:		**Date/Time:**	**Condition**
[signature]		-	
Received by Lab:		**Date/Time**	**Condition**
Mike Dopa		6/12/85 9:40am	Good

13400-B Northup Way, Suite 38, Bellevue, Washington 98005 (206) 747-7899

Page 1 of 2

Copy 1 - Return to Original Sampler
Copy 2 - Laboratory Record
Copy 3 - Original Sampler

Figure I-2

APPENDIX J

SAFETY PLAN

1.0 SAFETY PLAN

1.1 PURPOSE

The purpose of this safety plan is to summarize the procedures used by Science Applications International Corporation to accomplish the USAF Installation Restoration Program Phase II field survey at McChord AFB, the Fort Lewis Military Reservation, and the American Lake Garden Tract, Washington. This plan is intended to apply to Science Applications International Corporation (hereafter "SAIC"), subcontractors to SAIC, and employees of other firms working under the technical direction of SAIC at the site of the investigation.

1.2 WORK DESCRIPTION

The work to be performed will help determine the source of environmental contamination in the American Lake Garden Tract. Estimates of the magnitude and extent of the contamination will be provided.

1.3 TECHNICAL EFFORT

Seismic refraction and electrical resistivity geophysical surveys will be performed in several areas to supplement existing knowledge of local geology and to aid in identifying the directions and rates of groundwater flow. Monitoring wells and observation wells will be installed within and near the American Lake Garden Tract. Standard penetration tests and split-spoon sampling shall be done as monitoring well borings are made. Wells will be developed and water samples shall be taken.

Groundwater sampling activities will focus on the volatile organic fractions.

Additional tasks include monitoring of groundwater quality parameters (pH, specific conductance, and temperature), and extensive monitoring of static water table elevations in nearby wells to examine influences on groundwater movement.

1.4 ACCIDENT PREVENTION

All on-site project personnel will read and maintain a copy of this safety plan and safety precautions. All on-site personnel should be familiar with recognized hazards prior to beginning work on the job site.

SAIC corporate policy B-19-1 states:

> "The personal and collective safety and health of all employees of this company is of primary importance. The prevention of occupationally (work related) caused injuries and illnesses is of such consequence that it shall be given precedence over operating productivity.
>
> Safety shall be practiced by all personnel at all times. Only safe methods and equipment shall be used.

It is the company's intent to always maintain effective standards for guarding against injuries and illnesses while on the job. To be successful, proper attitudes toward the prevention of injuries and illnesses on the part of all employees is required. Success in all safety and health matters also depends upon cooperation among the company, its supervisors, and all employees, and also between each employee and fellow workers. Only through such cooperative attitudes and efforts can a safety record in the best interest of all be established and preserved.

Our safety and health program is designed to reduce the number of injuries and illnesses to a minimum. Our goal is zero accidents, injuries and illnesses."

In an effort to protect our employees, the following standards will be met:

- All employees shall follow safe practices, use personal protective equipment as required, render every possible aid to safety operations, and report all unsafe conditions or practices.

- Work shall be well planned and supervised to prevent injuries.

- All employees shall be given frequent accident prevention instructions.

- Supervisors shall insist on employees observing and obeying every rule, regulation, and order as is necessary for the safe conduct of the work.

- All unsafe, unhealthy or hazardous conditions or places shall be immediately placed off limits, out of order, etc., and then promptly removed or corrected.

- No one shall knowingly be permitted or required to work with impaired ability or alertness caused by fatigue, illness or other factors such that the employee or others may be exposed to accidents or injury.

- No one will be allowed on the job while under the influence of intoxicating liquor or drugs.

- Horseplay, scuffling and other acts which have or tend to have an adverse influence on the safety or well-being of employees are prohibited.

- Crowding or pushing when boarding or leaving any vehicle or other conveyance is prohibited.

- Employees shall be alert to see that all guards and other protective devices are in their proper places and adjusted to operation equipment and shall report deficiencies promptly.

- Workers shall not handle or tamper with any tools, equipment, machinery, or facilities not within the scope of their duties, unless they are thoroughly qualified and have received instructions from their supervisor.

- All injuries shall be reported promptly, so that arrangements can be made for medical or first-aid treatment.

- When lifting heavy objects, use the large muscles of the leg instead of the smaller muscles of the back.

- When involved in activities such as welding, carpentry, etc., protect the eyes at all times through the proper use of goggles, hoods, etc.

- Know where you are going and how you are going to get there. Look before you move.

- Watch out for others; they may not be aware of what you are doing or where you are going.

- Wash thoroughly after handling injurious or poisonous substances, and follow all special instructions from authorized sources. Hands should be thoroughly cleaned just prior to eating.

- Loose or frayed clothing, dangling ties, finger rings, etc., shall not be worn near moving machinery or other sources of entanglement.

- Apparatus, tools, equipment and machinery shall not be repaired or adjusted while in operation, nor shall oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.

- Use common sense. If you do not know, don't do it.

1.5 OBSERVANCE OF USAF/USA REGULATIONS

SAIC and its subcontractors will observe and cooperate with all base and post regulations regarding access, vehicle operation, personal conduct, etc. while on McChord AFB or the Fort Lewis Military Reservation. Specifically: (1) all personnel will obtain passes to enter military installations and will check in and out through base or post guard stations, (2) all vehicles used on site will carry current registration and inspection information, and (3) all vehicle/equipment operators will carry valid driver/operator licenses.

1.6 SANITATION

Drinking water will be obtained from local culinary sources and dispensed from cooler cans and disposable paper cups. Every effort will be made to establish and maintain sanitary job conditions.

1.7 FIRST AID AND MEDICAL FACILITIES

SAIC and its subcontractors will have available first aid kits for treatment of minor injuries. All on site project personnel will be made familiar with the location and instructions to the nearest emergency medical care facility should emergency treatment be required.

1.8 ACCIDENT REPORTING

Accidents will be reported within one hour. All required accident report forms will be promptly completed.

2.0 SAFETY PRECAUTIONS

2.1 GEOPHYSICAL SURVEYS

A. Only qualified personnel with related field experience will be used for this work.

B. All drivers will have a valid driver's license.

C. Personal clothing standards will be enforced. Minimum requirements are listed below

1. Short sleeve shirt

2. Long trousers

3. Leather boots or work shoes or other appropriate protective shoes or boots. Canvas shoes, tennis or deck shoes are not acceptable.

4. Hard hats are optional since this is not a construction activity and will not take place in construction areas.

D. The field crew chief or geophysicist in charge on the site will be the job site safety officer and will be responsible for crew safety.

E. All personnel will be familiar with the location of the nearest emergency medical facility as well as direct routes to that facility.

2.2 DRILLING, WELL DEVELOPMENT, AND FLUSHING ACTIVITIES

A. Only qualified personnel with related field experience will be used for this work.

B. All drivers will have a valid driver's license.

C. Personal clothing standards will be enforced. Minimum requirements are listed below:

1. Short sleeve shirt

2. Long trousers

3. Safety toe leather boots or work shoes or other appropriate protective shoes or boots. Canvas shoes, tennis or deck shoes are not acceptable.

4. Hard hats will be required during drilling since this is a construction activity and will take place on and around overhead heavy equipment. Hard hats are optional during development and/or flushing of monitoring wells since this is not a construction activity and will not take place in construction areas.

5. Hearing protection in the form of either disposable foam earplugs, reusable rubber earplugs or earmuff type noise attenuators.

D. SAIC's field geologist or project manager will be on site and will be the job site safety officer responsible for crew safety.

E. All personnel will be familiar with the location of the nearest emergency medical facility as well as direct routes to that facility.

2.2.1 Safety Training

Persons designated to drill, develop, and flush monitoring wells will be familiar with the potential health and safety hazards associated with the work prior to commencing field activities. Specifically, the following topics should be reviewed:

A. Potential routes of contact with toxic and/or corrosive substances

1. Skin contact/adsorption

2. Eye contact

3. Inhalation

4. Ingestion

B. Types, proper use, limitations and maintenance of applicable protective clothing and equipment

1. Safety helmet

2. Hearing protection

3. Chemical goggles

4. Impervious/chemical resistant gloves

5. Impervious/chemical resistant safety-toe boots

6. Impervious body coverings (aprons, blouse, trousers)

C. Respiratory protection using half-facepiece air purifying respirator with replaceable filter cartridges

1. Hierarchy of protective controls: engineered, administrative, work practice, personal protective clothing and equipment.

2. Forms of respiratory protection: air purifying (disposal/reusable), air supplied, self contained.

3. Selection of respiratory protection based on hazard: dust, fume, mist, gas, irritant, poor warning properties.

4. NIOSH certification/approval of respiratory protection equipment.

5. Medical/physical fitness to wear respiratory protection.

6. Reporting of accidents and availability of medical assistance.

2.2.2 Work Practices

All well drilling, development and/or flushing activities will be conducted by persons wearing at least the minimum protective items listed above.

Field personnel will stand upwind from discharge ports or hoses when using mechanical methods of development and/or flushing.

Odorous or contaminated water conditions as determined with a field organic vapor analyzer will result in donning of organic vapor/acid gas respiratory protection.

All equipment used in well drilling, development, and/or flushing will be cleaned and rinsed with fresh water before being used in another well.

No food will be consumed at the well sites. Field personnel must wash thoroughly after participating in well drilling, development, and/or flushing activities. Hands and face should be thoroughly cleaned just prior to eating.

2.3 COLLECTION AND HANDLING OF SPLIT SPOON SAMPLES AND/OR DRILLING SAMPLES

2.3.1 Safety Training

Persons designated to collect or handle split spoon soil samples should be familiar with the potential health and safety haza-ds associated with the work prior to commencing field activities. Specifically, the following topics should be reviewed:

A. Potential routes of contact with toxic and/or corrosive substances

   1. Skin contact/adsorption

   2. Eye contact

   3. Inhalation

   4. Ingestion

B. Types, proper use, limitations and maintenance of applicable protective clothing and equipment

   1. Safety helmet

   2. Chemical goggles

   3. Impervious/chemical resistant gloves

   4. Impervious/chemical resistant safety-toe boots

   5. Impervious body coverings (aprons, blouse, trousers)

C. Respiratory protection using half-facepiece air purifying respirator with replaceable filter cartridges

   1. Hierarchy of protective controls: engineered, administrative, work practice, personal protective clothing and equipment.

   2. Forms of respiratory protection: air purifying (disposal/reusable), air supplied, self contained.

   3. Selection of respiratory protection based on hazard: dust, fume, mist, gas, irritant, poor warning properties.

   4. NIOSH certification/approval of respiratory protection equipment.

   5. Medical/physical fitness to wear respiratory protection.

D. Reporting of accidents and availability of medical assistance.

2.3.2 Protective Clothing and Equipment

All sample collection work will be performed by persons garbed in the following minimum protective items:

1. Long sleeve shirt

2. Long trousers

3. Chemical resistant/impervious boots

4. Gauntlet style, chemical resistant/impervious gloves

5. Chemical eye goggles or face shield

Depending on soil or groundwater properties, site conditions and weather, other items may be used for supplemental protection. Such items may include:

1. Respiratory (half-facepiece, air purifying)

2. Impervious apron

3. Impervious work blouse and/or trousers

2.3.3 Work Practices During Sampling

All sampling activities will be conducted by persons wearing at least the minimum protective items listed above.

Field personnel will stand upwind from the sampling location and upwind from extracted samples during their handling.

Odorous or contaminated soil, water, or site conditions as determined with a field organic vapor analyzer will result in donning of organic vapor/acid gas respiratory protection. Similarly, dusty site or soil sample conditions will result in donning particulate filter type respirators.

Soil or water samples which display contamination will be removed from the site in suitable sealed sample containers for analysis and eventual disposal.

Sample containers will be resistant to solution and breakage, and they must have a leakproof seal. If any of these conditions are not satisfied, the container should not be used.

Reagents used for sample preservation and solvents used for cleaning bailers, etc. shall be stored in approved clearly labelled containers with appropriate warning labels.

Pipettes used for delivery of reagents for sample preservation shall be dedicated to specific reagents and must be cleaned and rinsed before storage after sampling.

No food will be consumed at the well sites. Field personnnel must wash thoroughly after handling caustic, acidic, corrosive or hazardous substances. Personnel shall follow all special instructions on decontamination from authorized sources. Hands and face should be thoroughly cleaned just prior to eating.

2.3.4 Equipment, Personal and Site Hygiene

Punctured, internally contaminated, cracked, stubbornly soiled, protective items will be disposed of in sealed plastic bags.

Paper, rags, and other disposables used on site or in equipment/sample container clean up will be disposed of in sealed plastic bags.

Gloves, boots, other protective coverings and sampling equipment will be rinsed with clean water at the site before eating, drinking and at the conclusion of each day's activities. Respirators, if worn, will be used during the rinse down activity.

Where visual observation of cuttings or detected odors show contamination, personal protective items will be placed in clean bags after rinsing for transportation to an area where they can be thoroughly cleaned with detergent and water and inspected for leaks, cracks or other damage. Where only clean cuttings are present, protective items will be rinsed, inspected, dried and otherwise made ready for reuse. Respirators will be thoroughly cleaned, disinfected and repaired after each use.

Drill cuttings which are odorous, visually contaminated, or contaminated as determined with a field organic vapor analzyer will be sampled for laboratory chemical analysis. Ultimate disposal of the cuttings will be based on chemical analyses.

Odorous or contaminated soil cores or site conditions as determined with a field organic vapor analyzer will result in donning of organic vapor/ acid gas respiratory protection. Similarly, dusty site or drill cuttings will result in donning particulate filter type respirators.

Soil cuttings from well drilling which display contamination will be removed from the site in suitable sealed containers or drums for eventual disposal, or placed back into the borehole.

No food will be consumed on the drilling site. Employees will thoroughly wash their hands, forearms and face before consuming food or beverages other than water held in disposable cups. Drinking water will be available at the perimeter of the site being investigated. Disposable cups will be used to consume water after protective gloves are removed.

2.4 AQUIFER PUMP TEST STUDIES

2.4.1 Safety Training

Persons designated to perform the aquifer pump test studies will be familiar with the potential health and safety hazards associated with the work prior to commencing field activities. Specifically, the following topics should be reviewed:

A. Potential routes of contact with toxic and/or corrosive substances

   1. Skin contact/adsorption

   2. Eye contact

   3. Inhalation

   4. Ingestion

B. Types, proper use, limitations and maintenance of applicable protective clothing and equipment

   1. Safety helmet

   2. Chemical goggles

   3. Impervious/chemical resistant gloves

   4. Impervious/chemical resistant safety-toe boots

   5. Impervious body coverings (aprons, blouse, trousers)

   6. Hearing protection

C. Respiratory protection using half-facepiece air purifying respirator with replaceble filter cartridges

   1. Hierarchy of protective controls: engineered, administrative, work practice, personal protective clothing, and equipment.

   2. Forms of respiratory protection: air purifying (disposal/reusable), air supplied, self contained.

   3. Selection of respiratory protection based on hazard: dust, fume, mist, gas, irritant, poor warning properties.

   4. NIOSH certification/approval of respiratory protection equipment.

   5. Medical/physical fitness to wear respiratory protection.

   6. Reporting of accidents and availability of medical assistance.

2.4.2 Protective Clothing and Equipment

All aquifer pump test studies will be performed by persons garbed in the following minimum protective items:

1. Long sleeve shirt

2. Long trousers

3. Leather boots, work shoes or other appropriate protective shoes or boots. Canvas shoes, tennis or deck shoes are not acceptable.

4. Hard hats are optional since this is not a construction activity and will not take place in construction areas.

5. Hearing protection in the form of either disposable foam earplugs, reusable rubber earplugs or earmuff type noise attenuators when on the flight line.

2.4.3 Work Practices

Odorous or contaminated water conditions as determined with a field organic vapor analyzer will result in donning of organic vapor/acid gas respiratory protection.

All equipment used in the aquifer pump test studies activities will be cleaned and rinsed with fresh water before being reused.

No food will be consumed at the pump test site. Field personnel must wash thoroughly after participating in aquifer pump test activities. Hands and face should be thoroughly cleaned just prior to eating.

APPENDIX K

BIOSKETCHES OF KEY PERSONNEL

RICHARD W. GREILING

EDUCATION

University of Wisconsin, B.S., Industrial Engineering (1973)
University of Wisconsin, M.S., Sanitary Engineering (1975)
University of Wisconsin, M.S., Water Resources Management (1975)
University of Washington, Cold Regions Engineering (1980)

PROFESSIONAL ENGINEERING REGISTRATION

Alaska (CE-4940), Arkansas (CE-5794), Nevada (CE-6569), Washington (CE-17737), and Wisconsin (CE-18130)

PROFESSIONAL EXPERIENCE

Principal Investigator for the field confirmation and preparation of the Phase I Records Search at Shemya AFB, Alaska, Malmstrom AFB, Montana, and Fairchild AFB, Washington. The projects included site survey of all hazardous waste disposal practices, including the examination of the storage, transfer, use, and disposal of aviation fuels, solvents, lubricants, and other petroleum products.

Project Manager for IRP Phase II site investigations at McChord AFB, Washington. To date the project has resulted in the siting and development of more than 30 groundwater monitoring wells, 22,000 linear feet of seismic refraction transects, and 25 electrical resistivity stations. Study results are being used to develop remedial actions for elimination of contaminant sources and treatment or disposal of contaminated soils and groundwater.

Project Manager for IRP Phase II site investigations at Kingsley Field, Oregon, and George AFB, California. The field investigations have included electrical resistance and magnetometer surveys across abandoned landfills to determine the location and areal extent of suspected buried chemical wastes in steel drums, boring and development of groundwater monitoring wells, and soil and groundwater chemical characterization. Field investigations have also included evaluation of liquid fuels pressure test procedures, and exfiltration testing of buried industrial/storm sewers to identify areas of probable contaminant release.

Quality assurance oversight in the performance of RCRA Section 3012 preliminary assessments at 400 potential hazardous waste disposal sites in Washington State. The project entails the records search of regulatory and resource management agencies, on-site surveys, and interviews of owner/operators and adjacent property owners for the purposes of identifying the potential risks associated with past and current hazardous waste management practices.

Directed a feasibility analysis and impact assessment for long-term disposal strategies for hazardous wastes in the State of Alaska. The study includes integrating treatment, storage and disposal (TSD) information from RCRA permit applicants, and small generator data from an industrial inventory and survey with historical data on abandoned waste disposal sites across the state.

GREGORY S. MACK

EDUCATION

University of California, Santa Barbara: B.A., Geology (1976)
Oregon State University: M.S., Geology (1982)

PROFESSIONAL EXPERIENCE

Mr. Mack is currently a geochemist at the northwest office of Science Applications International Corporation (SAIC). He has participated in remedial investigations and Phase II of the Installation Restoration Program at McChord AFB. Mr. Mack has more than five years experience in water quality monitoring. His expertise is in the area of geochemistry, specializing in groundwater chemistry.

Prior to joining SAIC, Mr. Mack has served as a field geochemist on a major project in Eastern Washington. The focus of the project is the characterization of groundwater systems in the Pasco Basin and determination of their suitability for storage of high-level nuclear waste. The project is investigating the hydrologic and hydrochemical nature of groundwater systems in basaltic rock. Mr. Mack was a team leader in charge of hydrochemical sampling activities. His responsibilities included management of sampling activities, evaluation of field sampling techniques, evaluation of drilling fluid tracer data for sample integrity, and provision of hydrochemical input for various test plans and test specifications. Mr. Mack was also involved with geochemical modeling, aquifer testing, and computer software development.

Over the last 10 years, Mr. Mack has participated in a number of projects, including:

- investigation of the low temperature geothermal potential of various areas throughout the United States,

- on-site evaluation of small-aggregate and sand quaries in northwest Oregon,

- field work with high precision instruments used to monitor fault movement for earthquake prediction research,

- laboratory work involving rock sample preparation and construction of high pressure rock deformation press used in rock mechanic research.

Professional Membership

National Water Well Association

ROBERT L. PESHKIN

EDUCATION

Southampton College of Long Island University, B.S., Geology/Marine Science (1980)

PROFESSIONAL EXPERIENCE

Field geologist responsible for oversight of well drilling subcontractors and the collection and interpretations of soil samples and groundwater flow features during site investigations for hazardous waste monitoirng activities in accordance with the USAF Installation Restoration Program (IRP) at McChord AFB, Washington, George AFB, California, and Kingsley Field, Oregon. Field project assignments have employed multiple drilling techniques and installation of monitoring wells at depths in excess of 200 feet. Field investigations have also employed the use of seismic refraction and electrical resistivity geophysical techniques to define both groundwater table elevations and stratigraphic interfaces, and magnetometer surveys to delineate waste disposal trenches suspected of being repositories for containerized liquid hazardous wastes. Geohydrologic analyses were performed using field and geophysical data to determine groundwater movement, contaminant fluxes and boundaries, and rates of contaminant migration.

Project team member in the performance of 400 preliminary assessments of potential hazardous waste sites in Washington State in accordance with Resource Conservation and Recovery Act (RCRA) Section 3012. The project teams are conducting records searches, site surveys and interviews of owners/operators and adjacent property owners for the purpose of identifying and summarizing the potential risks associated with past and current hazardous waste management practices. Directly responsible for assessment of pollutant and leachate mobilization and migration, and environmental and health risks. Teams are assigning numerical ratings to all sites for data base profiling of hazardous waste site priority listing.

Geologist and investigator with the IRP Phase I records searches at Malmstrom AFB, Montana, and Fairchild AFB, Washington. Specific assignments included the collection and interpretation of geohydrologic and geomorphologic data for regional and site specific quantification of known or suspected past hazardous waste pollutant sources, pathways, and receptors.

Project field coordinator and field geologist responsible for sample collection at Everett, Washington municipal landfill in an effort to determine effects of tire fire.

Data analyst at EPA Region X updating NPDES wastewater discharge permits. Responsible for interpreting and coding discharge limits into the National Permit Compliance System (a computer tracking system for discharge compliance and monitoring information). Also assisted Data Processing Center in solving problems in the data base.

JAMES K. APPLEGATE

EDUCATION	Ph.D. Geophysical Engineering, Colorado School of Mines, 1974. M.S. Geophsical Engineering, Colorado School of Mines, 1969. B.S. Geophysical Engineering, Colorado School of Mines, 1966.
PROFESSIONAL REGISTRATIONS	Registered Professional Engineer: Colorado, Idaho Registered Geophysicist: California Registered Geologist: Idaho

EXPERIENCE

Dr. Applegate has extensive experience in the application of geophysical principles to the solution of geological problems in all areas of geoscience and geoengineering. He has worked for large companies, consulting firms, and has taught both geology and geophysics in universities. Dr. Applegate is a registered engineer, geologist, and geophysicist. His work experiences illustrate a similar broad professional background including experience in petroleum exploration, mineral exploration, geothermal exploration, and engineering geophysics.

His experience in petroleum geophysics covers a number of years and many geological provinces in the U.S. including the Gulf Coast, off-shore California, Nevada, Washington, Colorado, Idaho, Wyoming, Nebraska, New Mexico, and Arizona. Recent work includes an extensive exploration program for the Nigerian National Petroleum Corporation in the Chad Basin. This included over 8000 km of seismic data, gravity, magnetics, and imagery.

Dr. Applegate's background includes work of nuclear power plant sites in Italy, Texas, California, and Arizona. He participated in fault evaluation studies along the Trans-Alaska pipeline. He has extensive experience in applying innovative technologies to the determination of rock properties and the solution of engineering problems. He has designed and built several shear wave sources. Recent work has been in tunnel detection, groundwater exploration, and in evaluating nuclear waste repositories.

Mineral exploration activity has ranged from seismic refraction to map placer gold deposits to use of high resolution seismic reflection to map uranium bearing channels, coal beds, and tar sands. Other work has employed electrical and potential methods. His work in geothermal has been geographically wide-ranging and has used a variety of geophysical methods. He has worked extensively on geothermal research projects in Idaho implementing both surface and subsurface methods. He has also worked on geothermal exploration studies in Colorado, Nevada, Oregon, New Mexico, Imperial Valley, and the Geysers.

ANTHONY S. BURGESS

EDUCATION	B.Sc. Geology, University of Durham, U.K., 1966 Ph.D. Engineering Geology & Geohydrology University of Durham, U.K., 1970
EXPERIENCE	
1984 to Date	Principal, Golder Associates. Management, specialist technical input and review for hazardous waste, groundwater contamination, and radioactive waste disposal projects.
1979 to 1984	Head, Technical Development Department Acres Consulting Services, Niagara Falls, Canada. Staff responsibility for multidisciplinary group undertaking wide variety of projects, including software development and modeling for heat and mass transfer, stress and structural analysis, system simulation, data base management. Technical responsibility for projects and work tasks in groundwater contamination (gasoline leakage, municipal and hazardous waste sites), dewatering (mines in Canada and Brazil), radioactive waste disposal (HlW and LLW design concepts, demonstration facility, residue storage facility, reverse well and island disposal concepts, hydrogeology of plutons), northern and permafrost engineering (thaw around oil wells, mine plant and dock, risk-reliability study for LNG terminal), geotechnical engineering (seismic analyses of dams; terrain analysis, air leakage for underground compressed air energy storage system, geotechnical aspects of thermal and low head hydro plants).
1977 to 1979	Senior Geotechnical Engineer Acres Consulting Services, Niagara Falls, Canada. Geotechnical and geohydrological projects including regional geology and geohydrological modeling for HLW repository, Sweden, groundwater inflow to mines and tunnels, radon transport in groundwater, ground source heat pumps.
1973 to 1977	Site and Office Geotechnical Engineer, Crippen Acres Engineering, Winnipeg, Canada. Design of large cofferdams and earthfill structures. Coordination of civil, mechanical, gteotechnical, hydraulic and electrical aspect for diversion and impounding at hydroelectric station. Field geotechnical engineer involving grouting, rock bolting, geological mapping, controlled blasting, dyke foundations on permafrost, fill placement.
1972 to 1973	Senior Soil Engineer, Geocon, Fredericton, New Brunswick. Organization and supervision of site investigations, laboratory testing.
1970 to 1972	Soils/Geological Engineer, Ove Arup and Partners, London, U.K. Supervision of site investigation and test piling. Site investigation and conceptual engineering for deep basement in clay.

ROBERT L. BURK

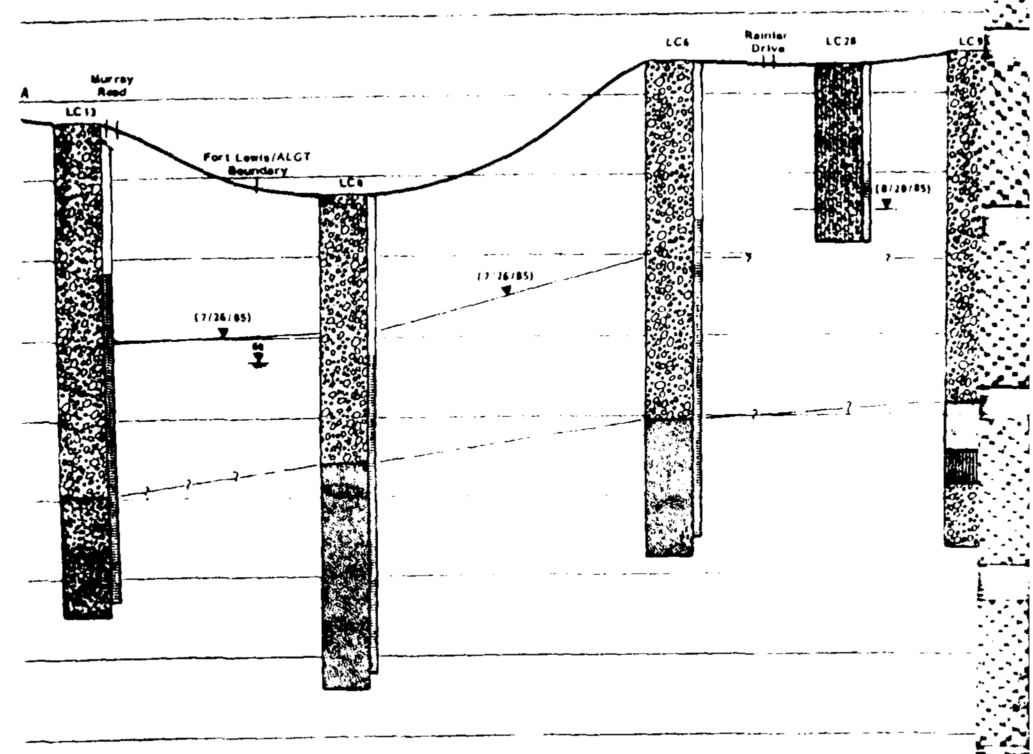
EDUCATION

B.S., Geology, San Diego State University (1969)
M.S., Geology, University of Washington (1971)
Ph.D., University of Washington (1979)

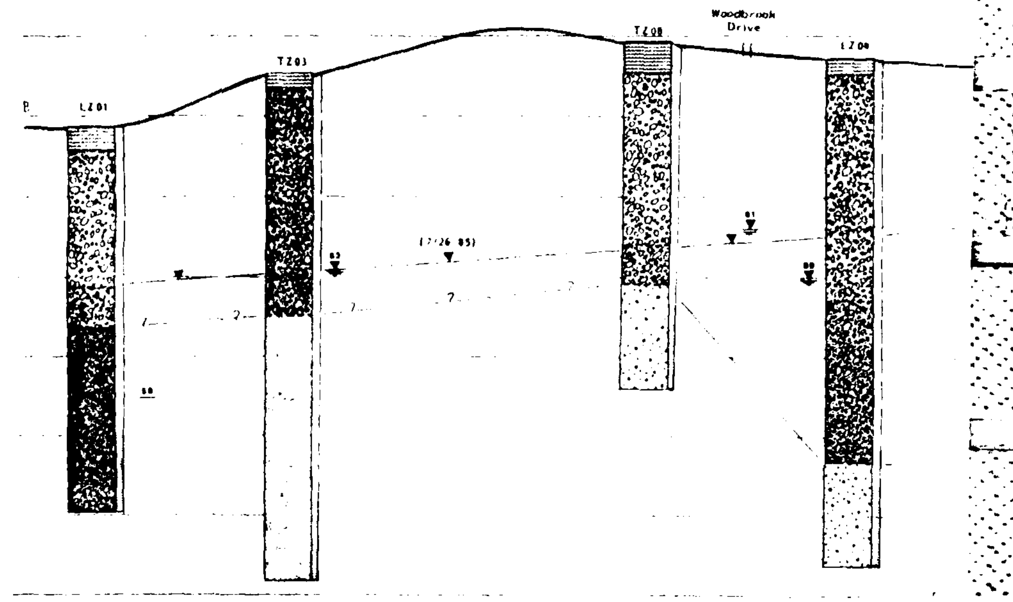
EXPERIENCE

1984 to Date	Senior Geologist, Golder Associates. Responsible for geologic assessment of salt as a potential radioactive waste repository. Involved in developing geologic reference site criteria for performance assessment models of a radioactive waste repository in North Central Region crystalline rocks. Engineering geology associated with siting a major power transmission line for the Kodiak Electric Association, Kodiak Island, Alaska.
1981 to 1984	Senior Geologist, DOWL Engineers. Geologist in charge of geologic mapping, rock mechanics, and surficial geologic studies for hydropower sites at Silver Lake, Bradley Lake, King Cover, Old Harbor, Larsen Bay and Togiak, Alaska. Geologic mapping for these projects focused on joint patterns, fault-trace analyses, road aignments and powerline routes. Conducted studies of slope stability, groundwater supplies, seismic risk, waste disposal sites, and snow avalanche hazards for private and public sector clients. Directed the geology, geophysics and hydrology staff at DOWL.
1979 to 1981	Research Associate, University of Washington. Utilized geochemical tracers to study biospheric components of the global carbon budget. Involved work in both North and South America.
1976 to 1979	Private consulting Geologist. Extensive work for government, business and individual clients involving geologic hazards, permafrost studies, land use planning, and sediment yield. Analyzed numerous slope stability problems in the Seattle Area and recommended engineering solutions.
1975	Engineering Geologist, R. and M. Consultants. Logged testholes and conducted field mapping of permafrost areas along the Trans-Alaska Pipeline.
1974	Geologist, Wilsey and Ham. Documented relationships between slope stability and turbidity at three Oregon reservoirs. Conducted environmental assessments for Pacific Northwest construction projects.
1971	Project Geologist, SEREM of Alaska (BRGM-France). Responsibility for field mapping and minerals evaluations of potential ore deposits throughout Alaska.

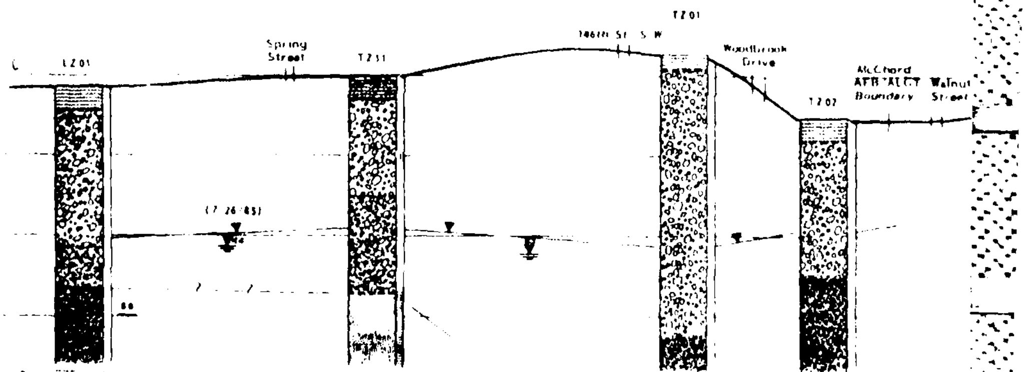
A-A'

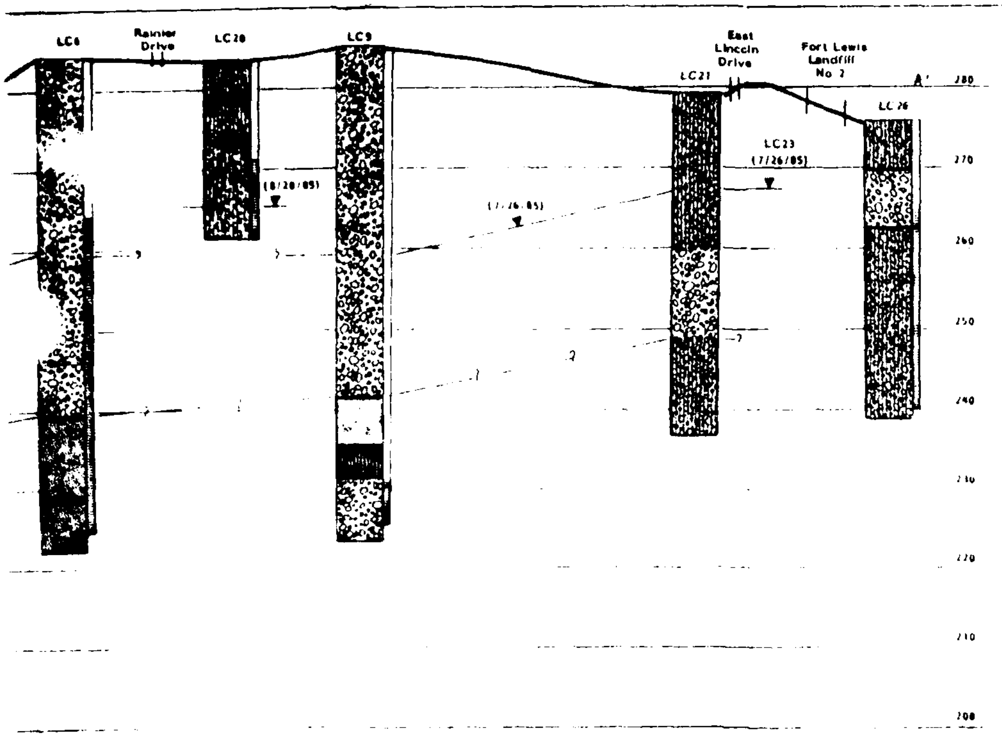

A
Murray Road
LC13
Fort Lewis/ALGT Boundary
LC8
LC6
Rainier Drive
LC28
LC9
(7/26/85)
(8/20/85)

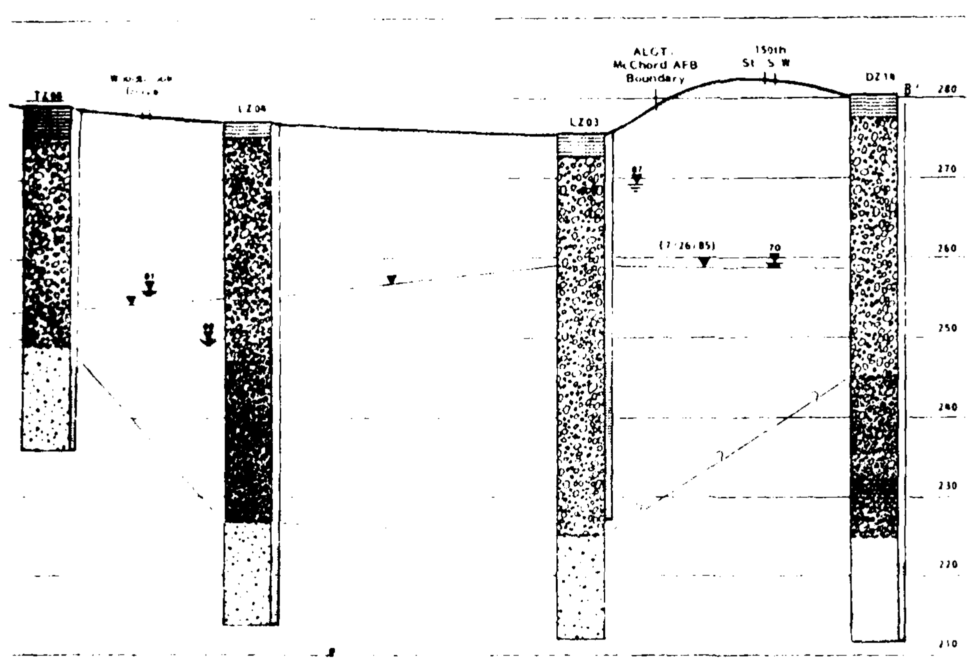
B-B'

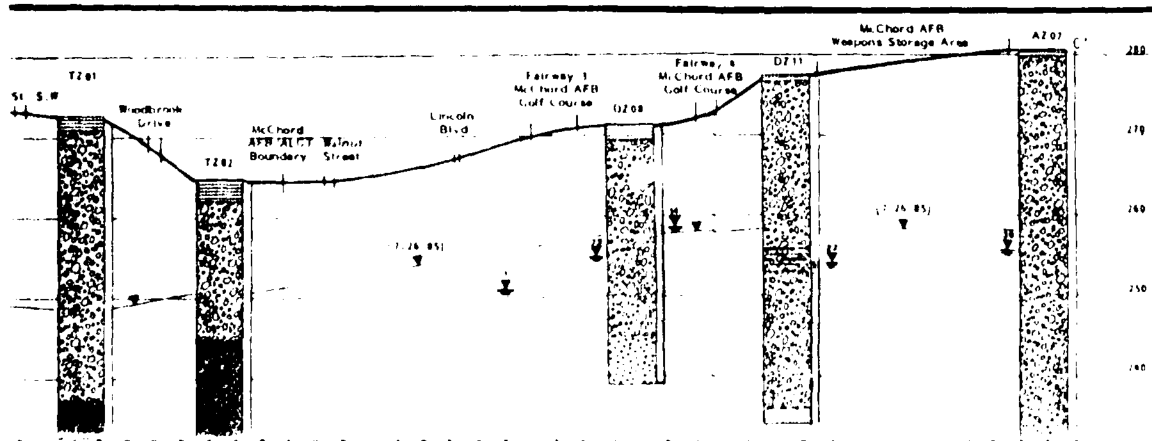

B
LZ01
TZ03
TZ08
Woodbrook Drive
LZ04
(7/26/85)

C-C'

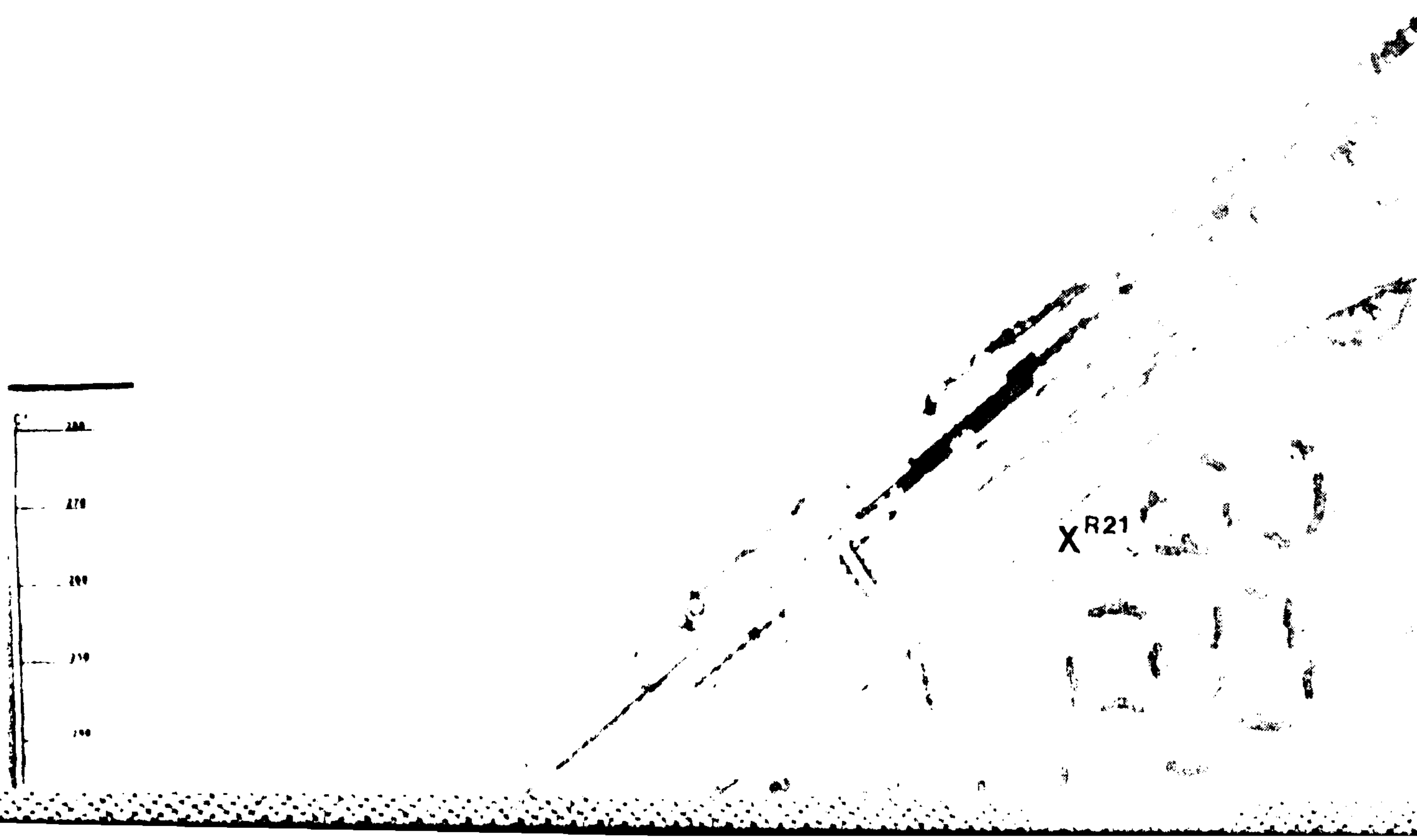

LZ01
Spring Street
TZ31
146th St. S.W.
TZ01
Woodbrook Drive
McChord AFB/ALGT Boundary
Walnut Street
TZ02
(7/26/85)


LC6
Rainier Drive
LC20
LC9
East Lincoln Drive
LC21
Fort Lewis Landfill No 2
A'
LC26
LC23
(7/26/85)
(8/20/85)
(7/26/85)
280
270
260
250
240
230
220
210
200


LZ04
LZ03
ALGT McChord AFB Boundary
150th St S W
DZ16
B'
(7/26/85)
280
270
260
250
240
230
220
210

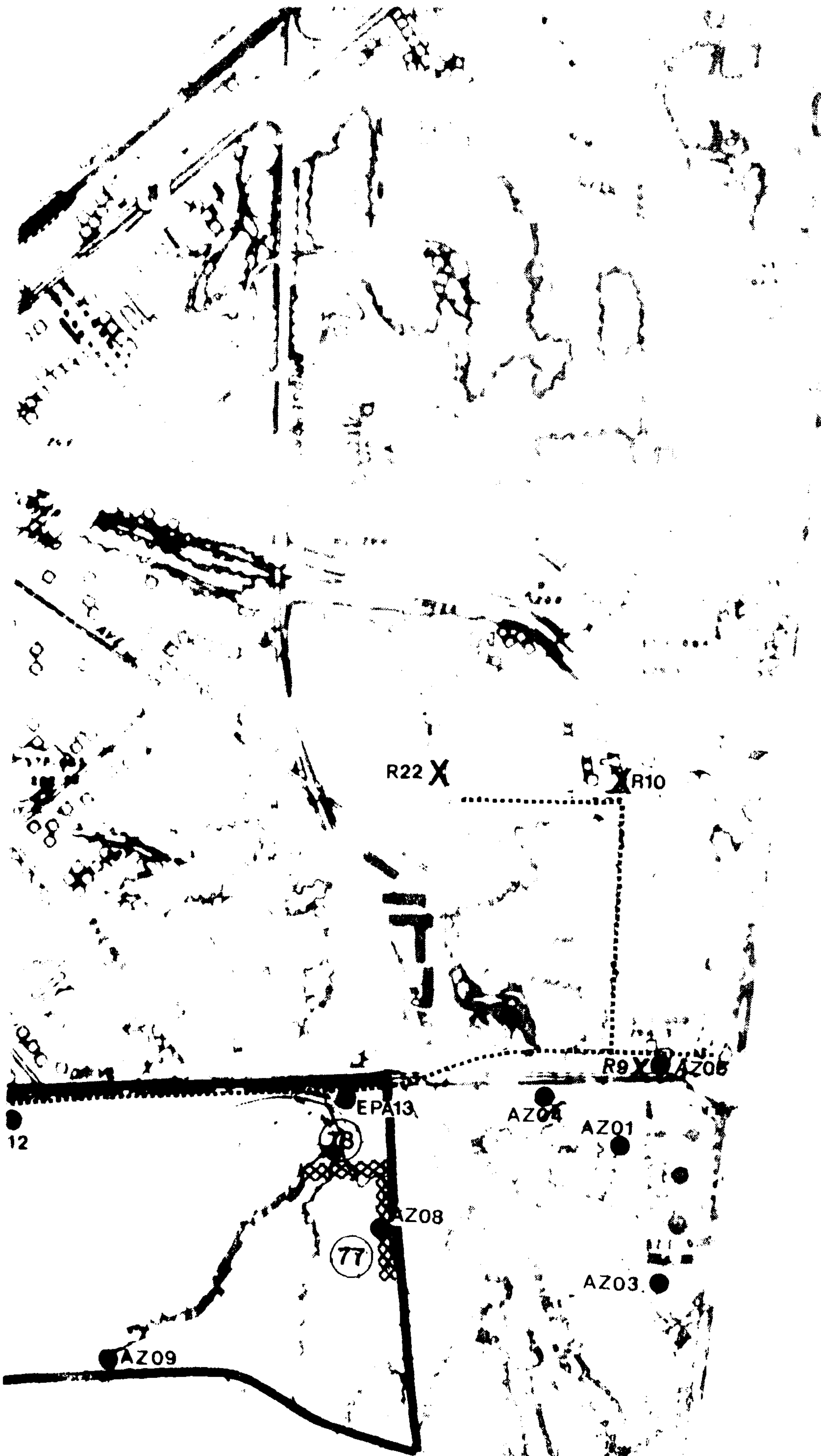

TZ01
St. S.W
Woodbrook Drive
TZ02
McChord AFB ALGT Boundary
Walnut Street
Lincoln Blvd
Fairway 3 McChord AFB Golf Course
OZ08
Fairway 4 McChord AFB Golf Course
DZ11
McChord AFB Weapons Storage Area
AZ07
C'
(7/26/85)
(7/26/85)
280
270
260
250
240

3

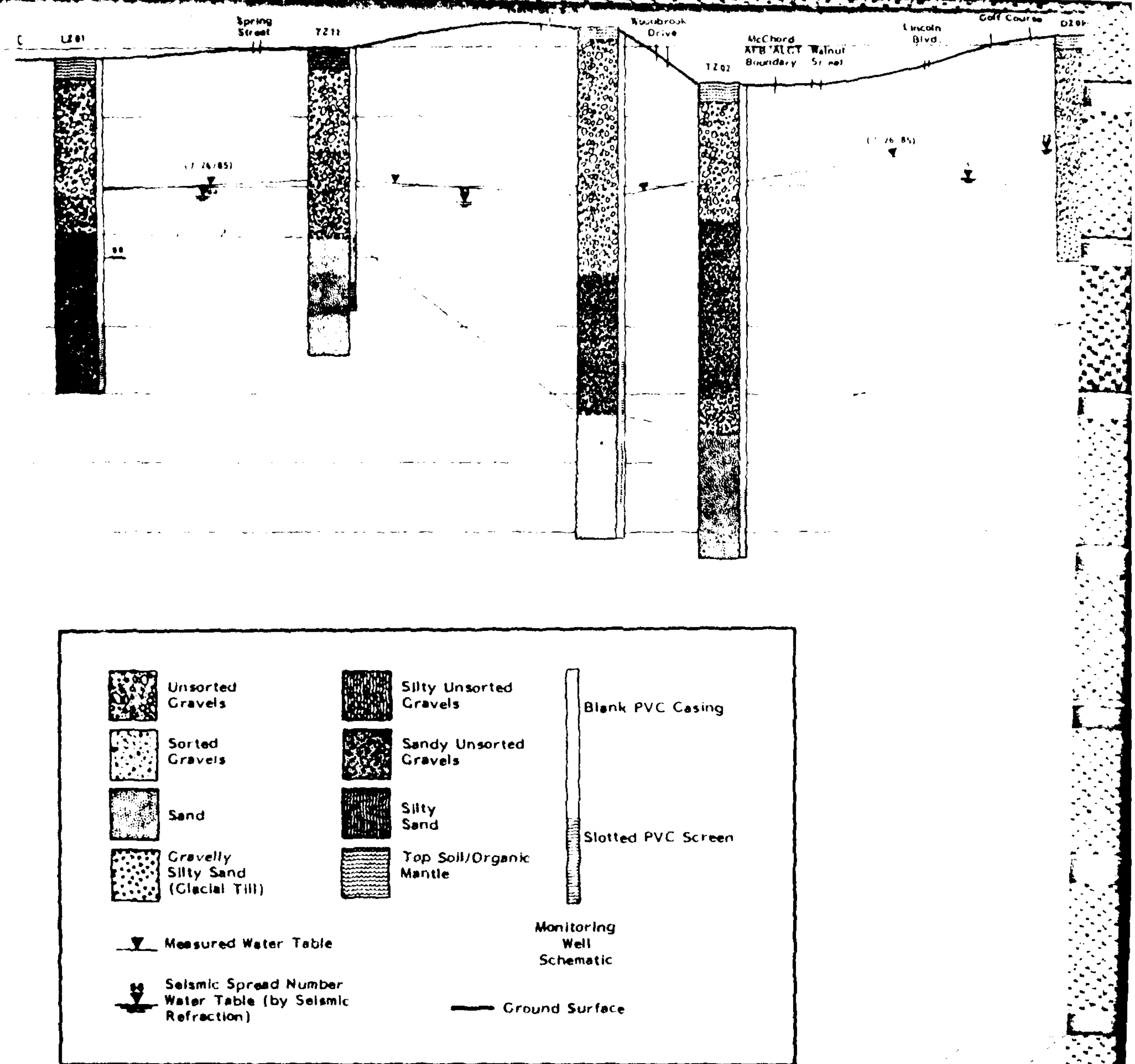


(4)

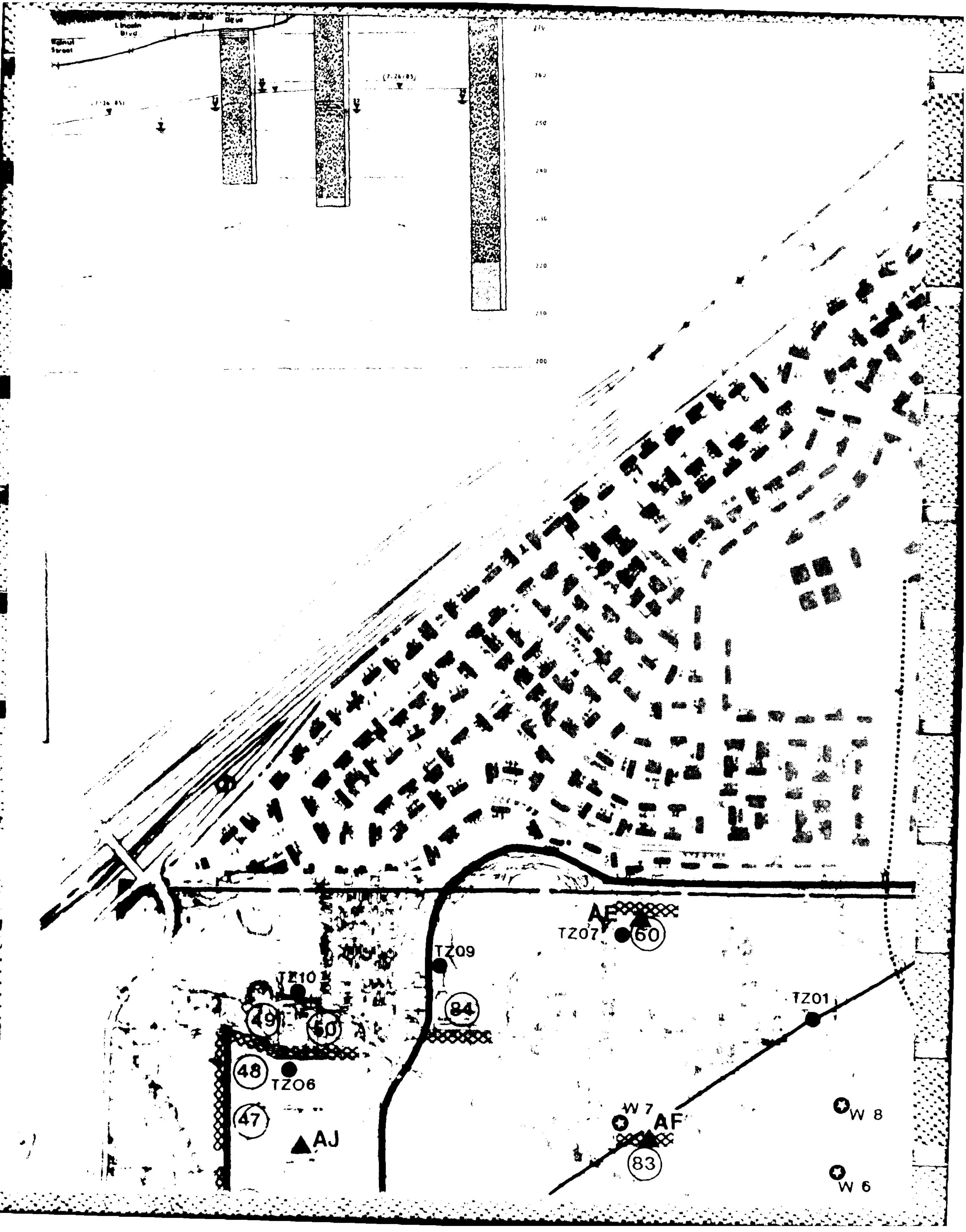
5



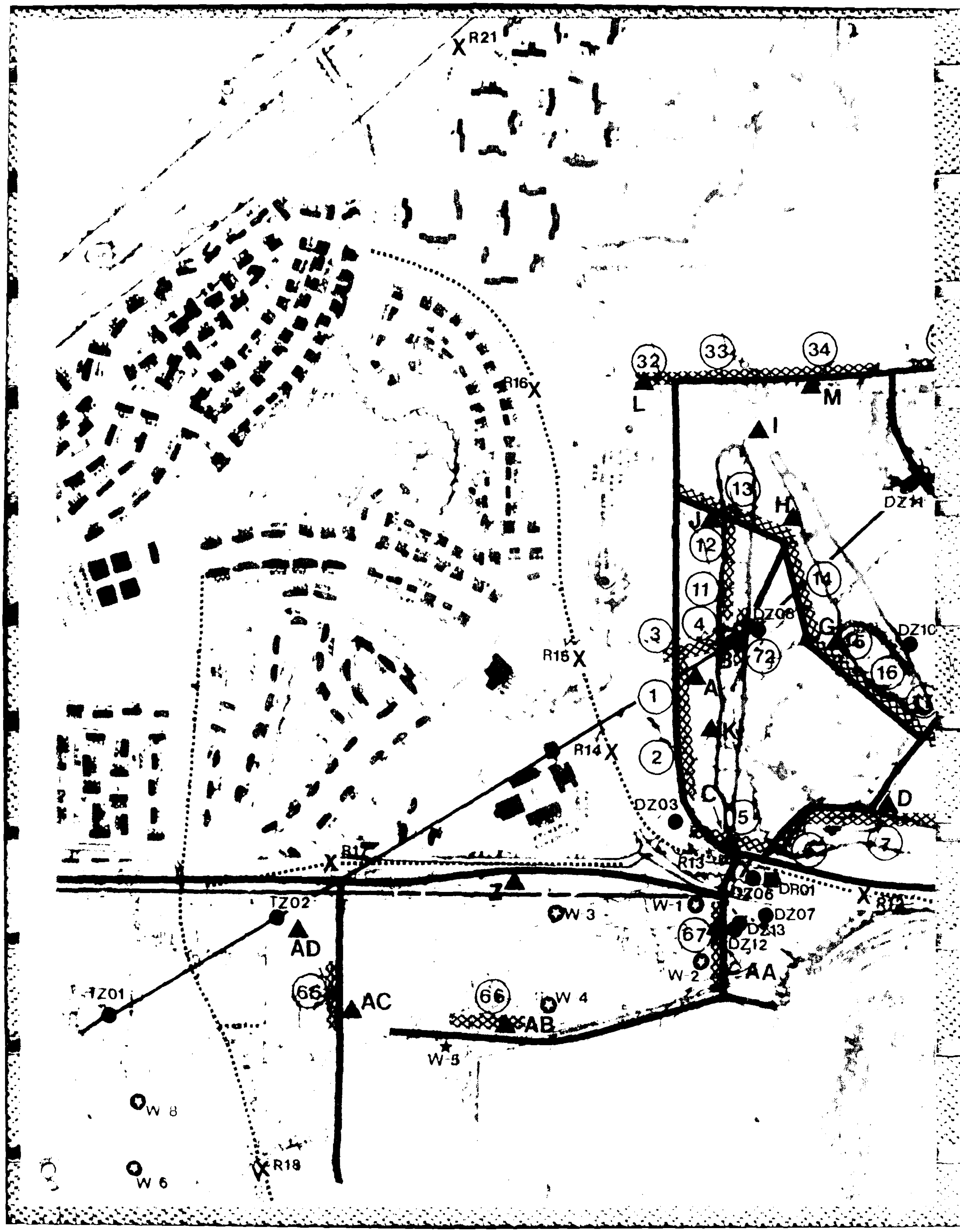
C-C′



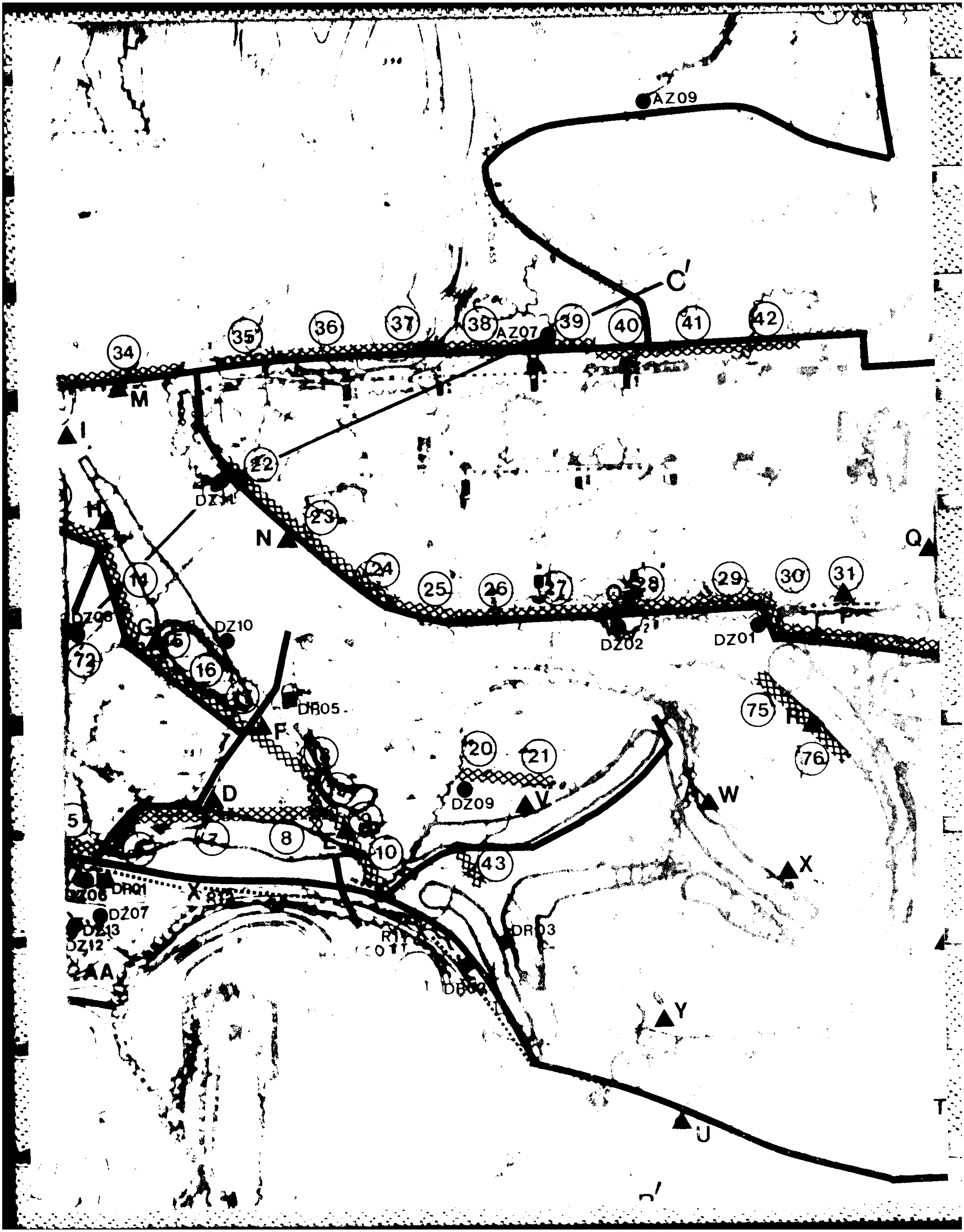
Spring Street
TZ11
McChord
Lincoln Blvd.
Golf Course
TZ02
(7/26/85)
Unsorted Gravels
Sorted Gravels
Sand
Gravelly Silty Sand (Glacial Till)
Silty Unsorted Gravels
Sandy Unsorted Gravels
Silty Sand
Top Soil/Organic Mantle
Blank PVC Casing
Slotted PVC Screen
Monitoring Well Schematic
Measured Water Table
Seismic Spread Number Water Table (by Seismic Refraction)
Ground Surface



Lincoln Blvd
(7/26/85)
250
240
220
210
200
AF
TZ07
60
TZ09
TZ10
49
50
84
TZ01
48
TZ06
47
AJ
W 7
AF
83
W 8
W 6

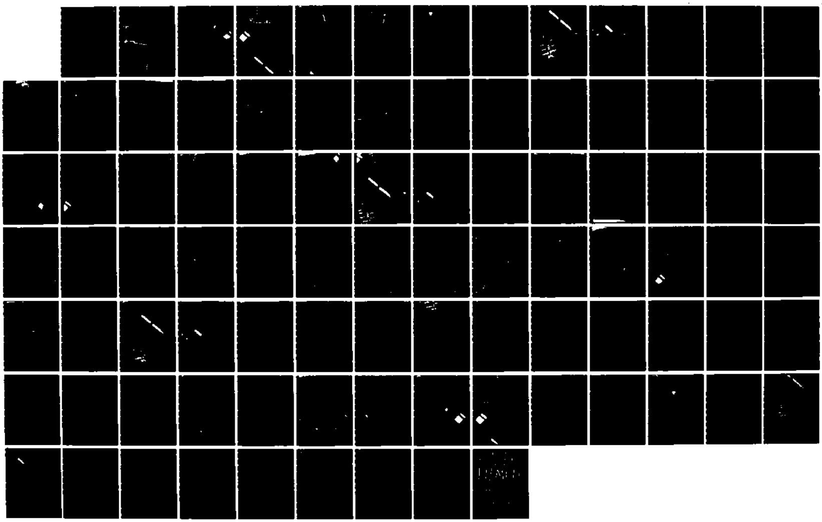


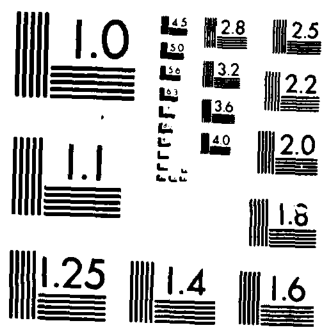
R21
R16
32
33
34
L
M
I
13
H
DZ11
J
12
14
11
4
3
DZ08
G
DZ10
15
72
R15
B
16
A
1
K
R14
2
D
DZ03
5
7
R13
Z
DZ06
DR01
R12
W-1
W 3
DZ07
TZ02
AD
67
DZ13
DZ12
W-2
AA
65
AC
66
W 4
AB
TZ01
W-5
W 8
W 6
R18


AZ09
C′
34
35
36
37
38
AZ07
39
40
41
42
M
I
22
DZ11
H
23
N
Q
14
24
25
26
27
28
29
30
31
DZ08
G
DZ10
DZ02
DZ01
72
16
DR05
F
75
76
20
21
D
DZ09
V
W
5
7
8
10
43
X
DR01
DZ07
DZ13
DZ12
A
DR03
Y
T
U

AD-A164 835 INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION S..(U) SCIENCE APPLICATIONS INTERNATIONAL CORP BELLEVE WA R W GREILLING ET AL. 7/7

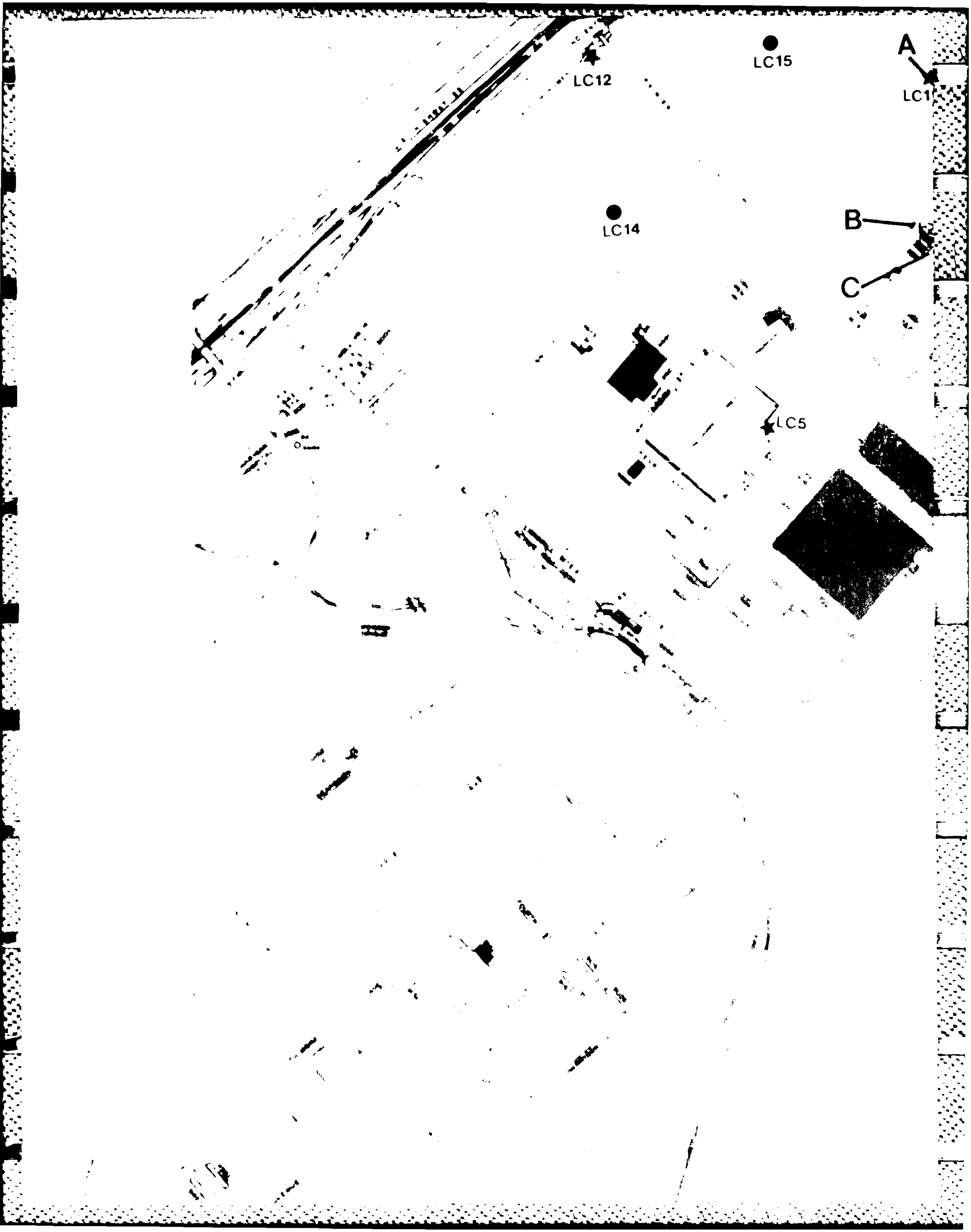
UNCLASSIFIED 20 DEC 85 SAIC-85/1791 F33615-80-D-4002 F/G 13/2 NL



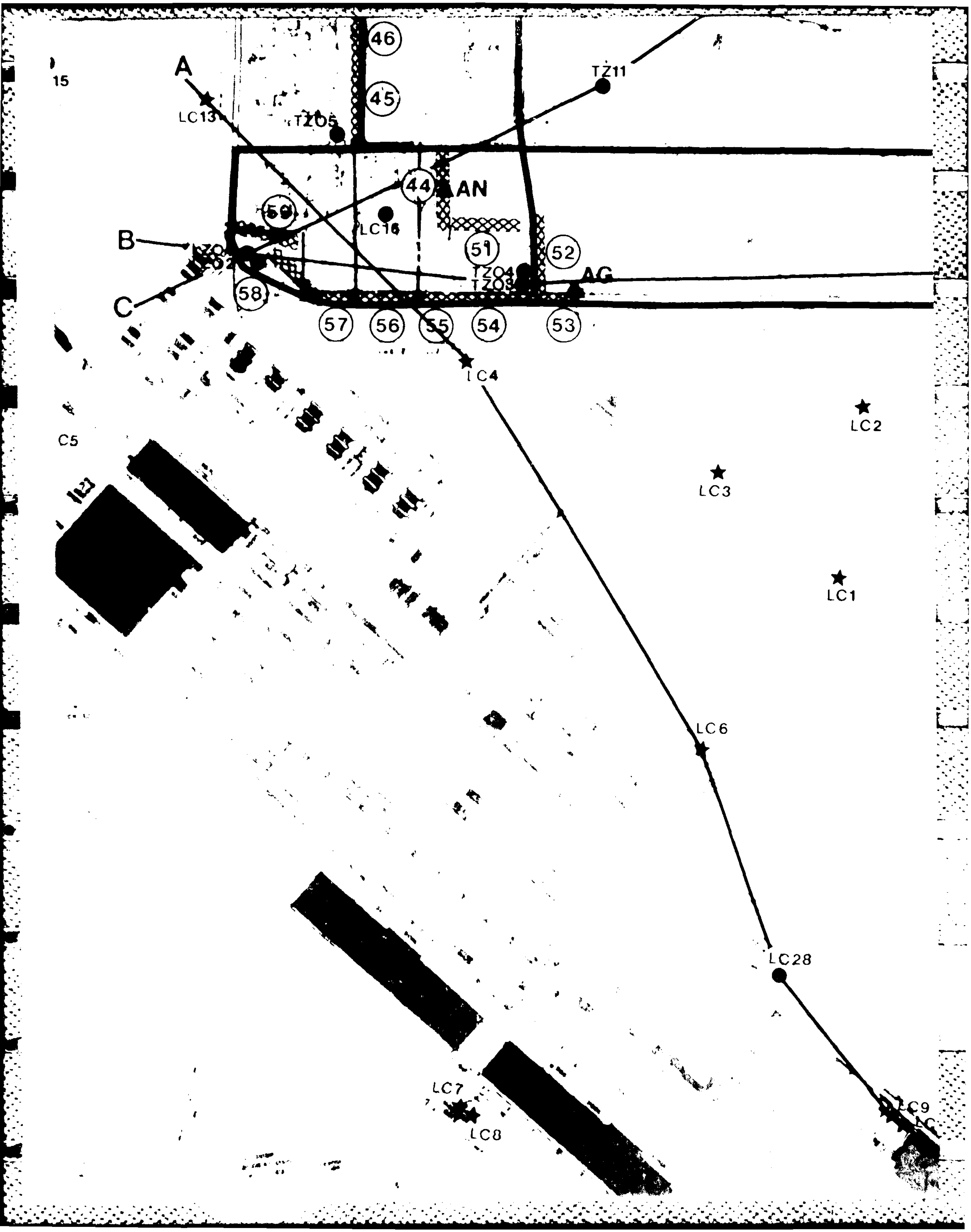


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

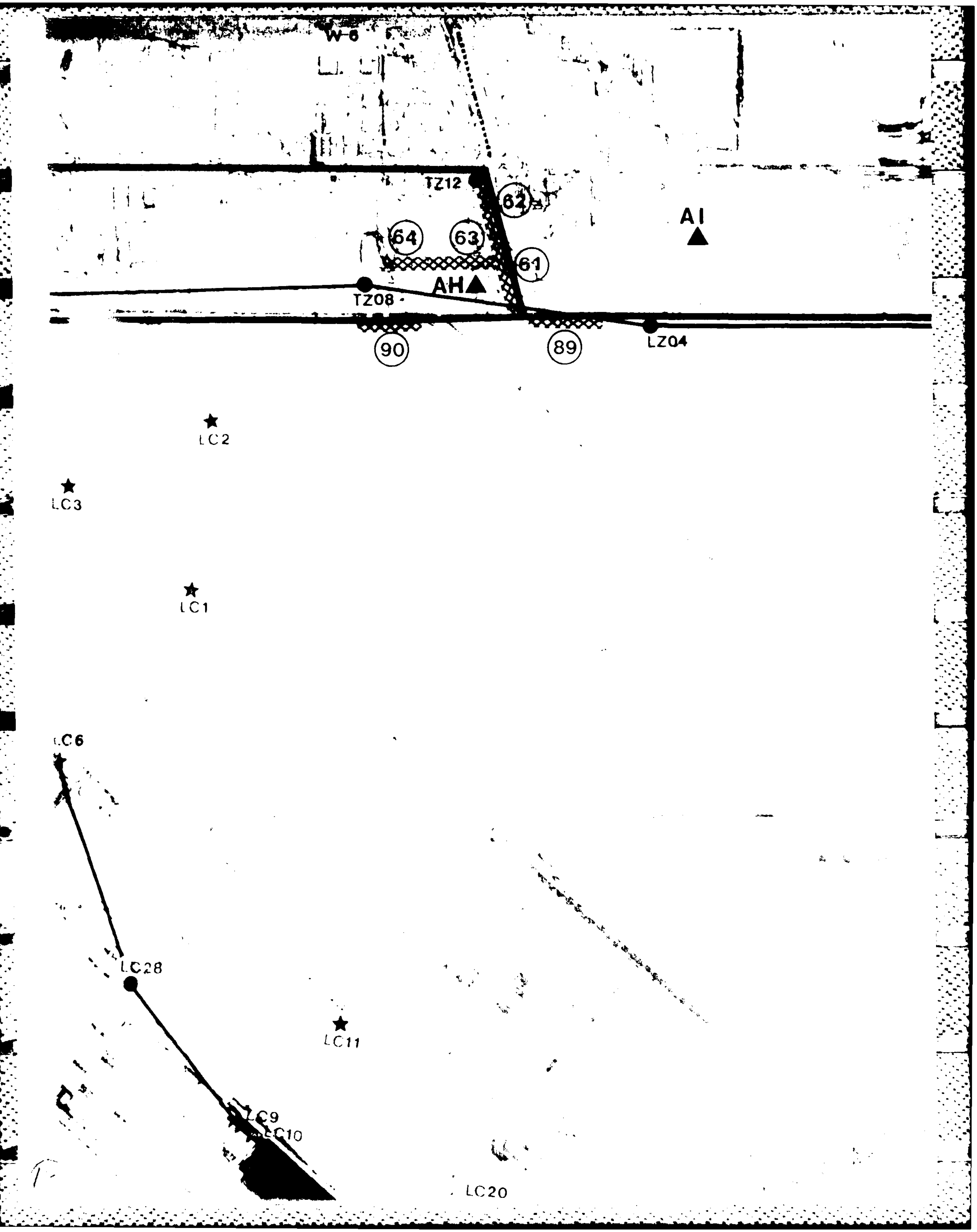
71
AZ03
AZ09
C'
39
40
41
42
Q
82
28
29
30
31
DZ02
DZ01
75
76
W
X
S
74
Y
AL
73
T
U

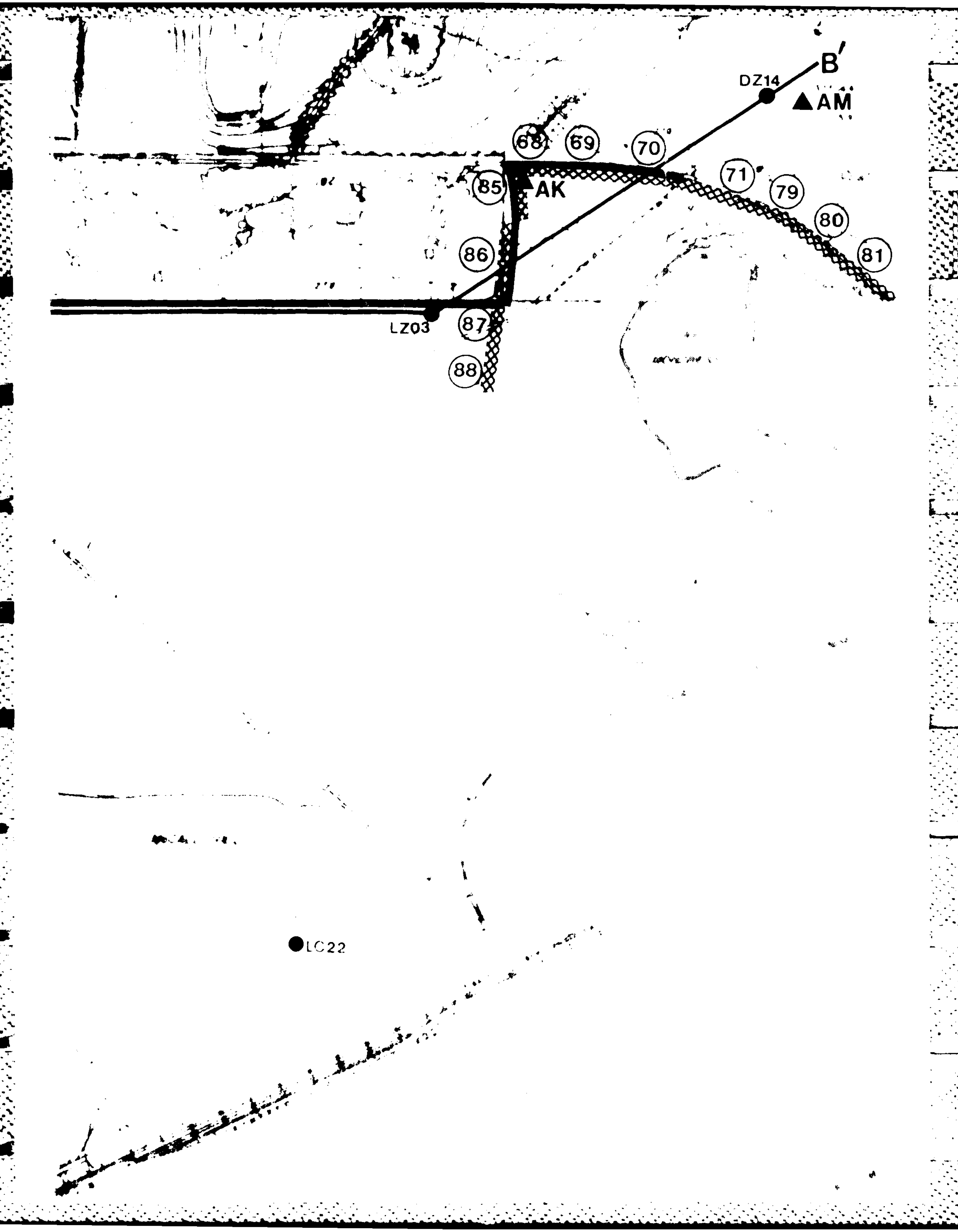


LC12
LC15
A
LC1
LC14
B
C
LC5

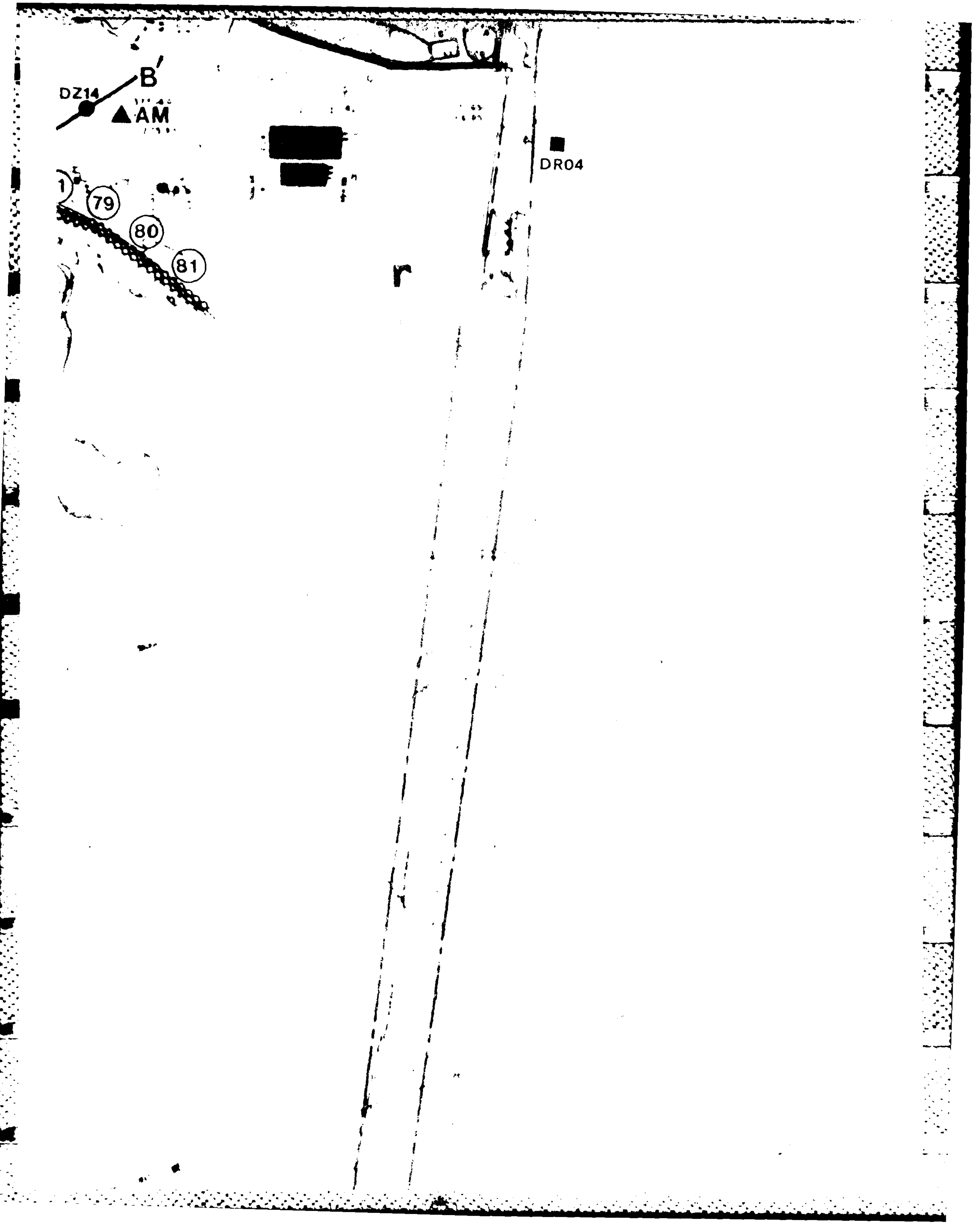


15
A
B
C
LC13
TZO5
TZ11
46
45
44
AN
59
LC16
51
52
TZO4
TZO3
AG
58
57
56
55
54
53
LC4
LC2
LC3
LC1
C5
LC6
LC28
LC7
LC8
LC9

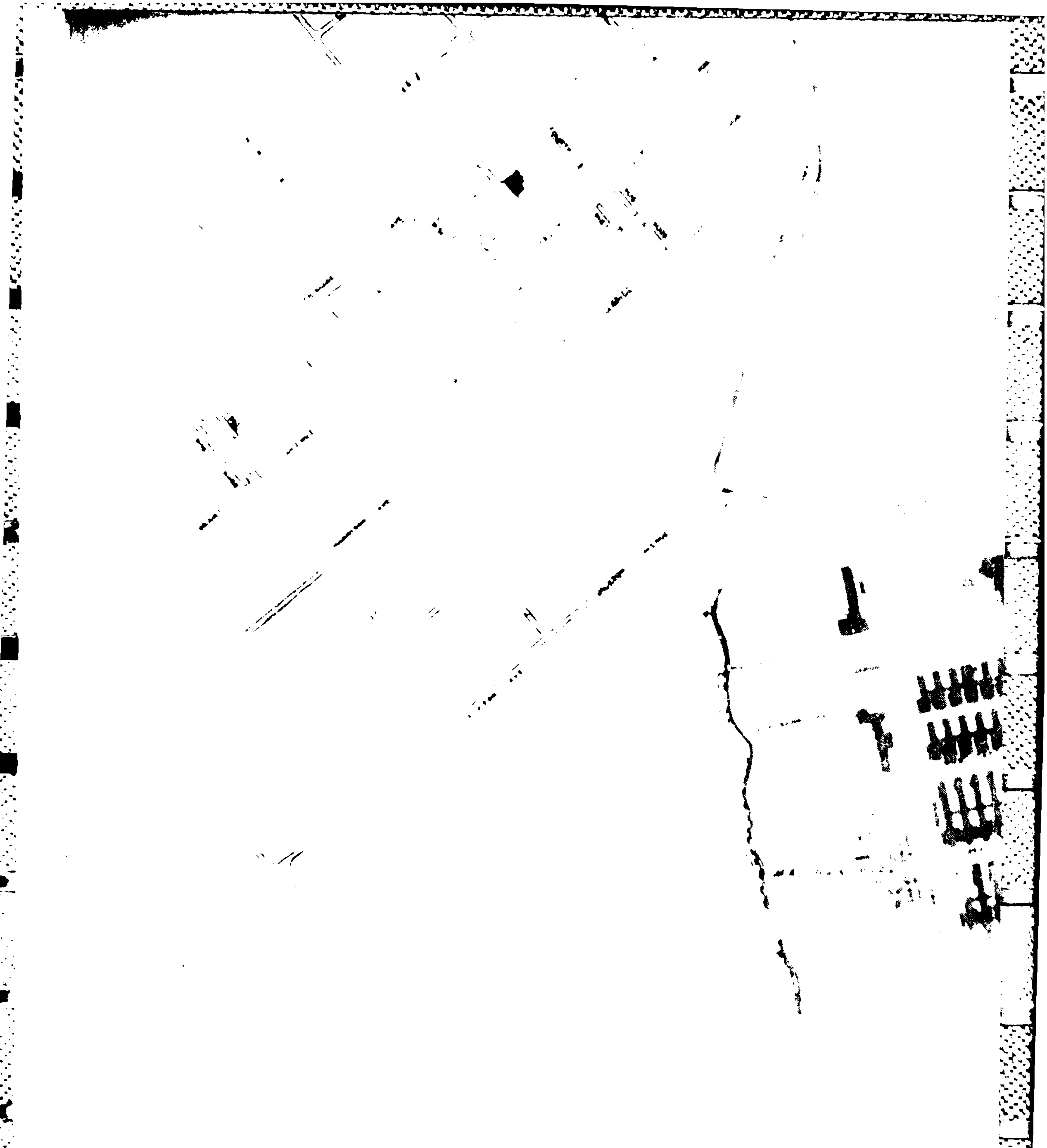

W-6
TZ12
62
AI
64
63
61
AH
TZ08
90
89
LZ04
LC2
LC3
LC1
LC6
LC28
LC11
LC9
LC10
LC20



B'
DZ14
AM
68
69
70
85
AK
71
79
80
81
86
LZ03
87
88
LC22



B'
DZ14
AM
DR04
79
80
81



SAIC Science Applications International Corporation

13400-B Northup Way, Suite 38, Bellevue, Washington 98005

PLATE 1 - GEOPHYSICAL LINES AND STATIONS, GEOLOGIC CROSS SECTIONS, AND GROUNDWATER MONITORING

● 2" ID

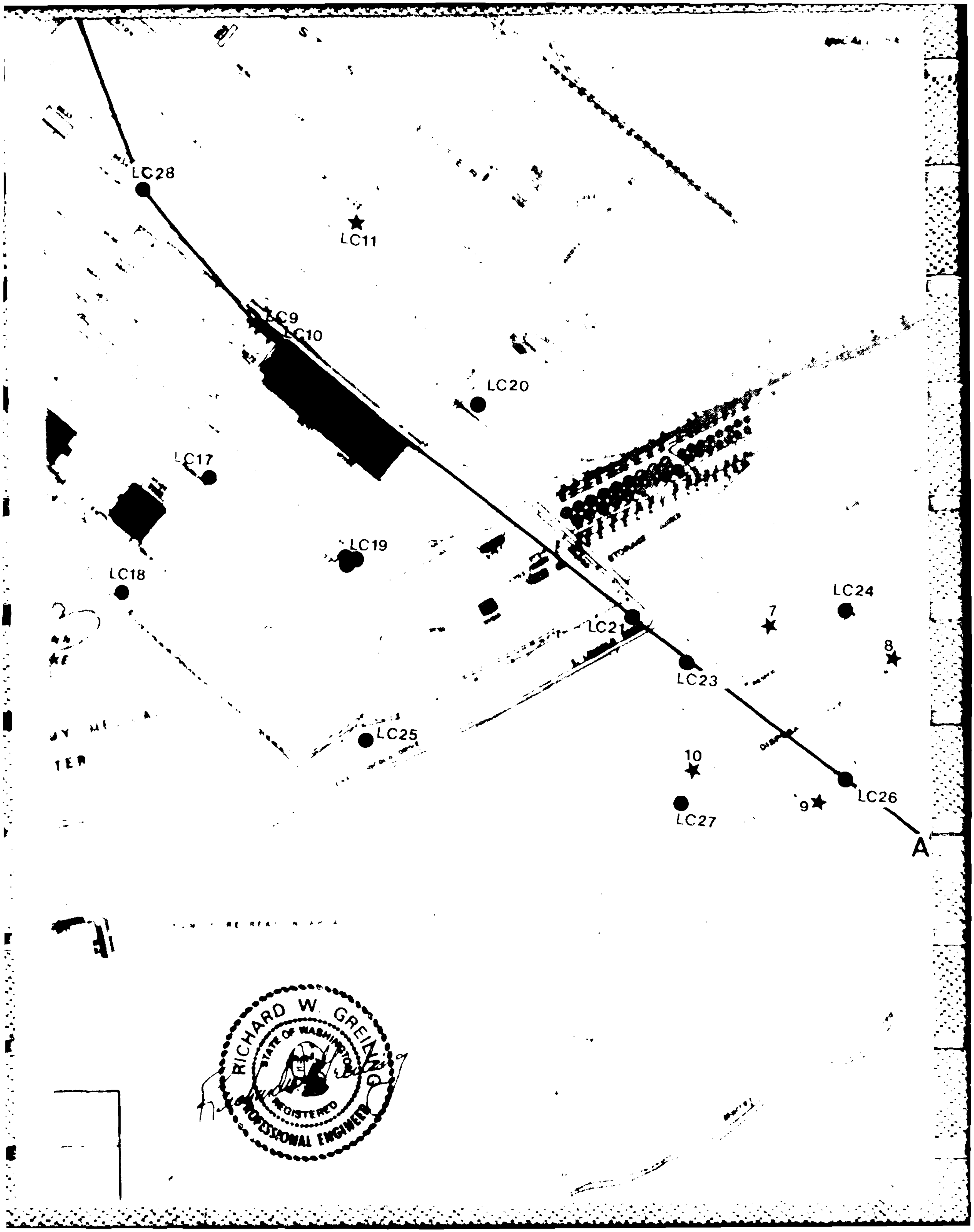
■ 6" ID O

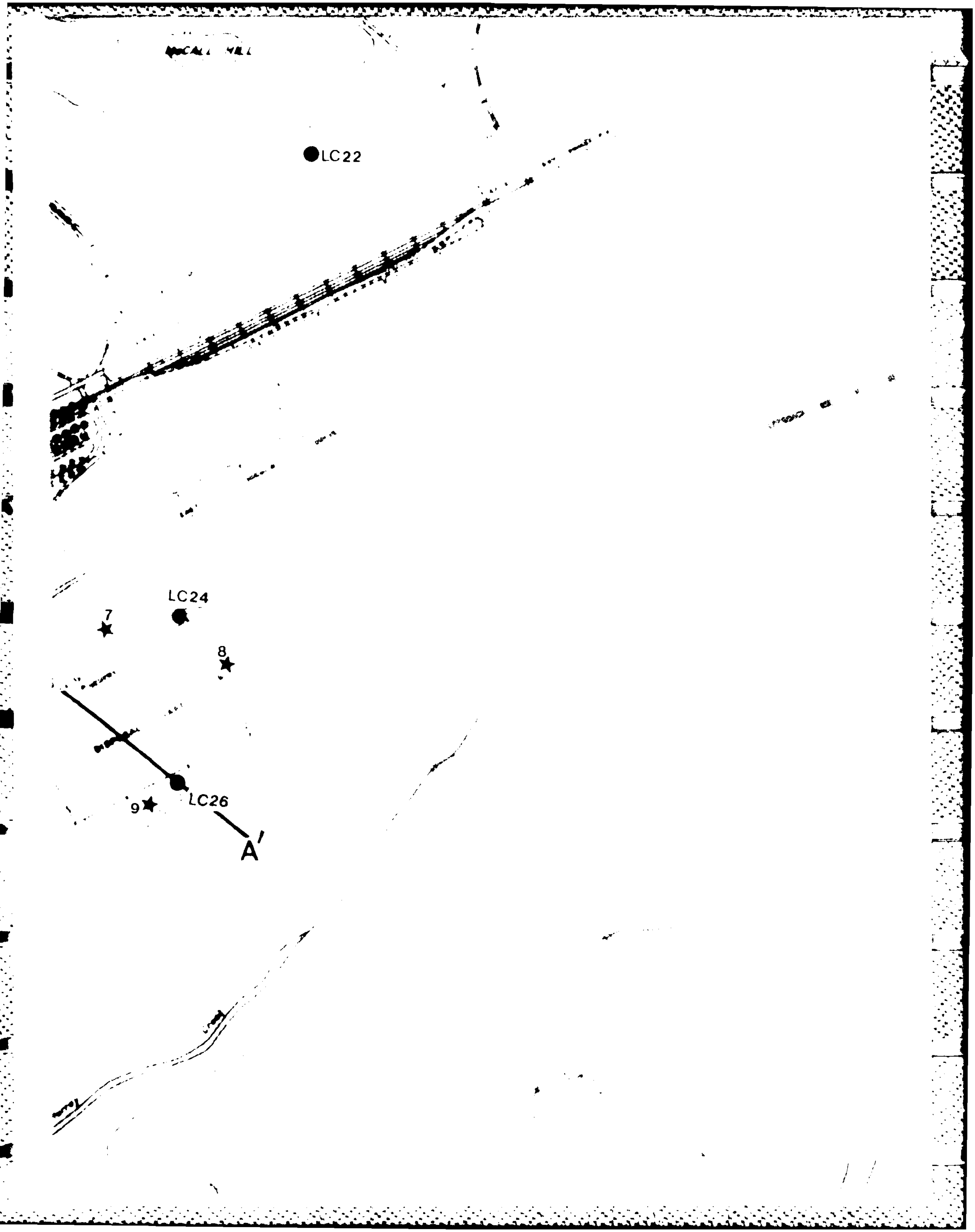
✪ EPA

LEGEND

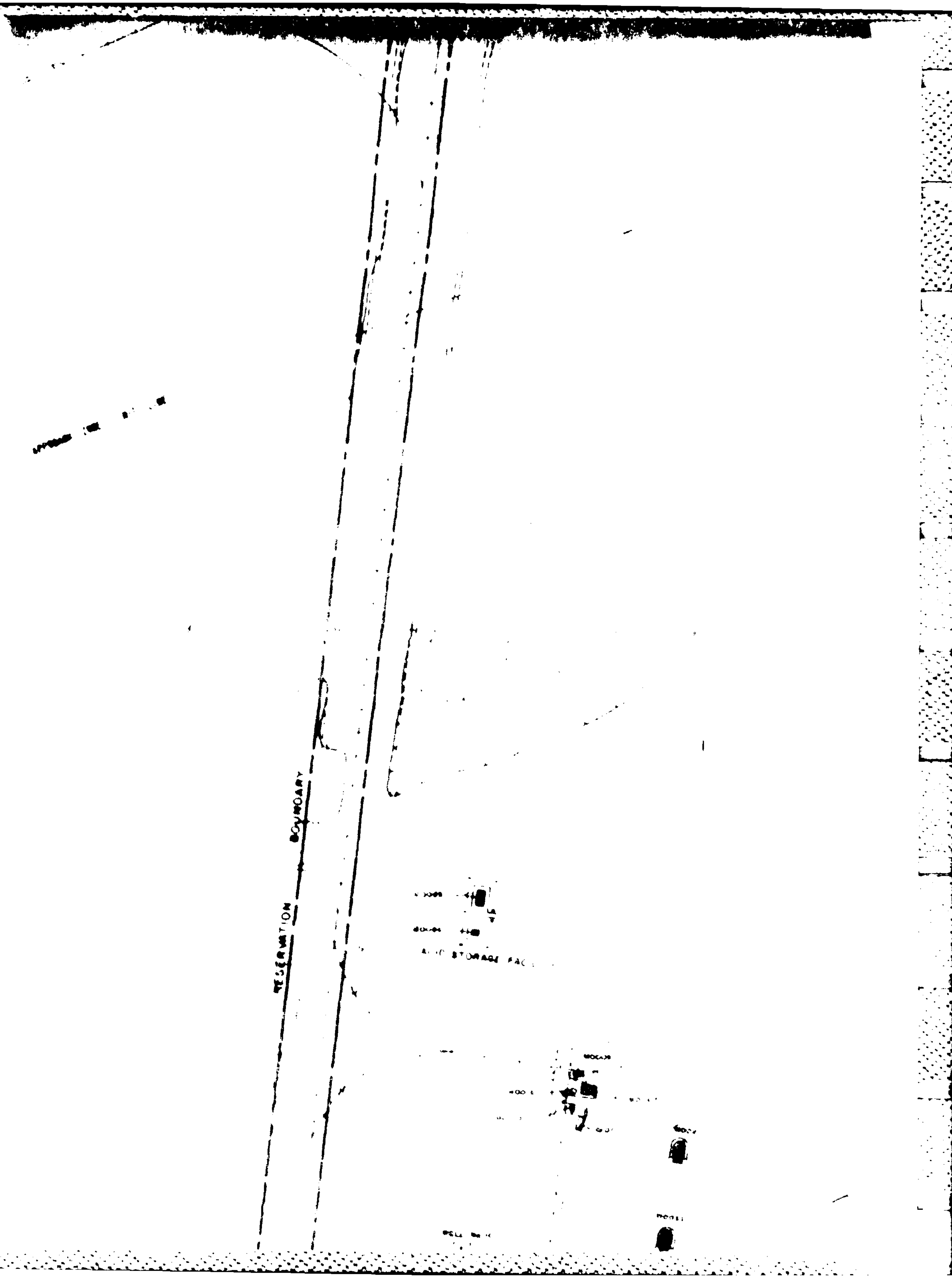
6" ID Observation Well

APPROXIMATE
MAG DEC


LC28
LC11
LC9
LC10
LC20
LC17
LC19
LC18
LC24
7
LC21
8
LC23
LC25
10
LC26
9
LC27
A
RICHARD W. GREINING
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER



LC22
LC24
7
8
LC26
9
A′


RESERVATION
BOUNDARY

SAIC Science Applications International Corporation
13400 B Northup Way, Suite 38, Bellevue, Washington 98005

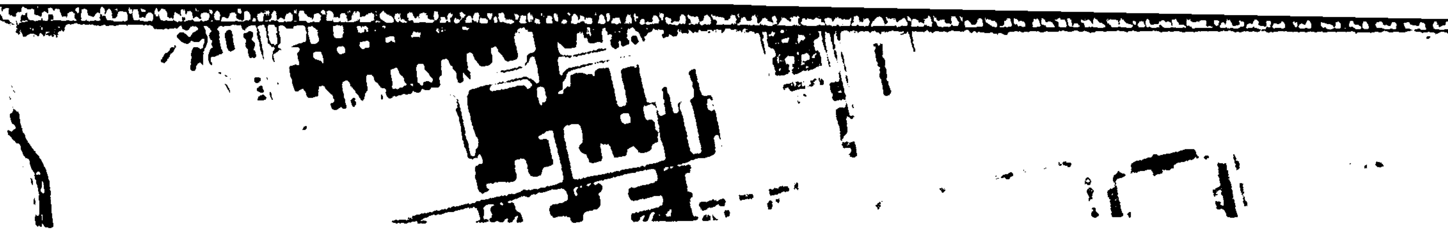
PLATE 1 GEOPHYSICAL LINES AND STATIONS, GEOLOGIC CROSS SECTIONS, AND GROUNDWATER MONITORING WELLS IN THE AMERICAN LAKE GARDEN TRACT STUDY AREA

Department of the Air Force
Occupational and Environmental Health Laboratory
Brooks AFB, Texas

SCALE: As Shown	DRWN: JPD	DATE
	CHCK: EP	14 Aug 85
SHEET: 1 of 1	APPR:	

REVISIONS			
REV	DATE		INT
1	9/19	ALGT boundary, geologic cross-sections.	JPD
2	12/5	Revise cross-sections and SP lines.	EP

2" ID ...
6" ID Ob...
EPA Ne...
4" ID Mo...
Electrica...
Electrica...
Seismic R...
Seismic R...
Self Pote...



on

	INT
	JPD
IS	

LEGEND

- 2" ID Monitoring Well
- 6" ID Observation Well
- EPA Nested Well
- 4" ID Monitoring Well
- Electrical Resistivity Station (1985)
- Electrical Resistivity Station (1983)
- Seismic Refraction Survey Line (1985)
- Seismic Refraction Survey Line (1983)
- Self Potential Survey Line

APPROXIMATE MAG DEC.

True North

Magnetic North

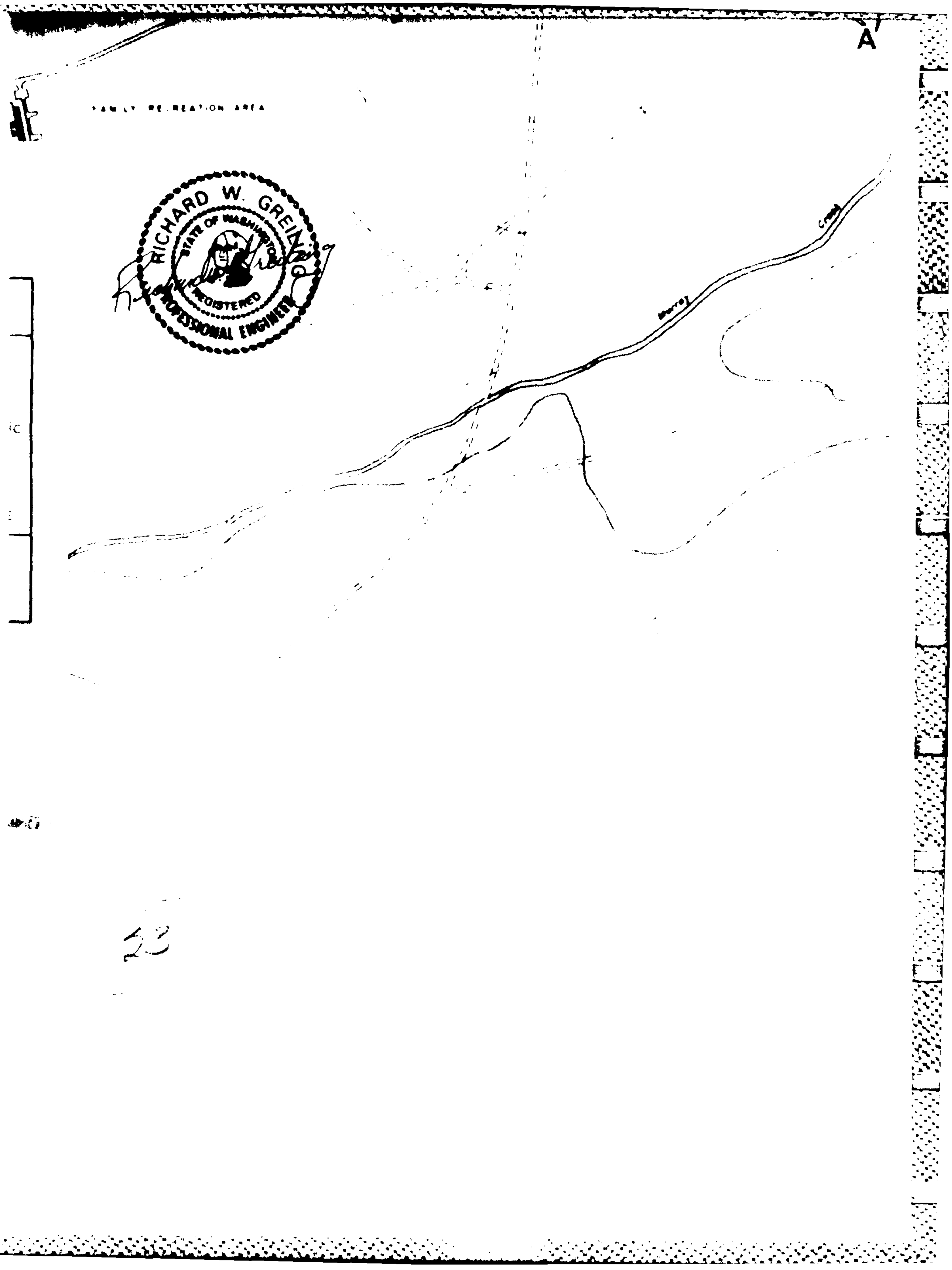
2°E

DIAGRAM FOR NUMERICAL VALUE ONLY

500 0 500 1000

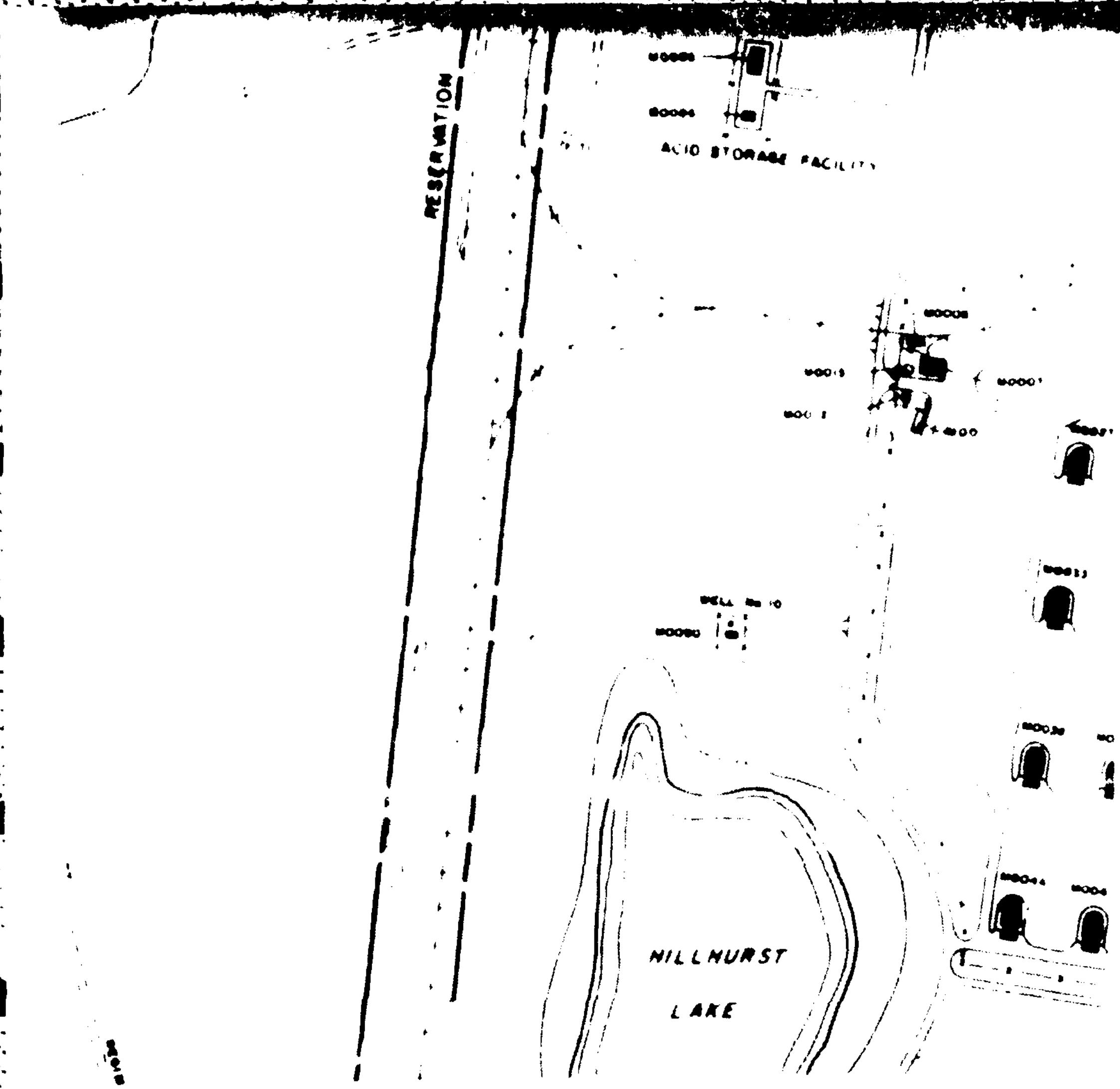
GRAPHIC SCALE IN FEET

22


A'
FAMILY RECREATION AREA
RICHARD W. GREINING
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER
Murray
Creek
23


A'
Creek

25



(1)

SAIC Science Applications International Corporat
13400-B Northup Way, Suite 38, Bellevue, Washington 9800

PLATE 2 - CONTOUR MAP OF GROUNDWATER LEVELS BASE
GEOPHYSICAL AND WELL DATA, AND PROPOSED PALEOCHA
IN THE AMERICAN LAKE GARDEN TRACT STUDY AREA

Water Levels Measured 26 July - 29 July 1985
Groundwater Levels Reported as Mean Sea Level Elevation

			REVISIONS		
Department of the Air Force Occupational and Environmental Health Laboratory Brooks AFB, Texas			REV	DATE	
			1	8/23	Add Flow Lines
			2	9/19	ALGT Boundary, Channel Definition
SCALE: As Shown	DRWN: JPD	DATE	3	12/19	Isoline Contours
SHEET: 1 of 1	CHCK: RD APPR: [illegible]	14 Aug 85			

(2)

ternational Corporation
3, Bellevue, Washington 98005

ATER LEVELS BASED ON
OPOSED PALEOCHANNELS
RACT STUDY AREA

July 1985
a Level Elevation

REVISIONS

	INT
Add Flow Lines	JPD
ALCT Boundary,	JPD
Channel Definitions	JPD
Isoline Contours	

LEGEND

- ● 2" ID Monitoring Well
- ■ 6" ID Observation Well
- ✪ EPA Nested Well
- ★ 4" ID Monitoring Well
- ——— Groundwater Isolines
- ----- Paleochannel with Surface Expression
- ◆ Approximate Groundwater Flow Direction
- 253.72 Groundwater Levels Reported as Mean Sea Level Elevation

APPROXIMATE MAG. DEC.

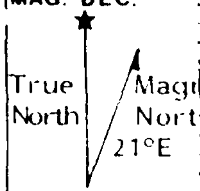


DIAGRAM FOR NUMERICAL VA ONLY

500 0 500 1000

Contour Interval 5 ft. GRAPHIC SCALE IN FEET

3

an Sea

APPROXIMATE
MAG. DEC.

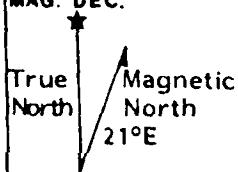
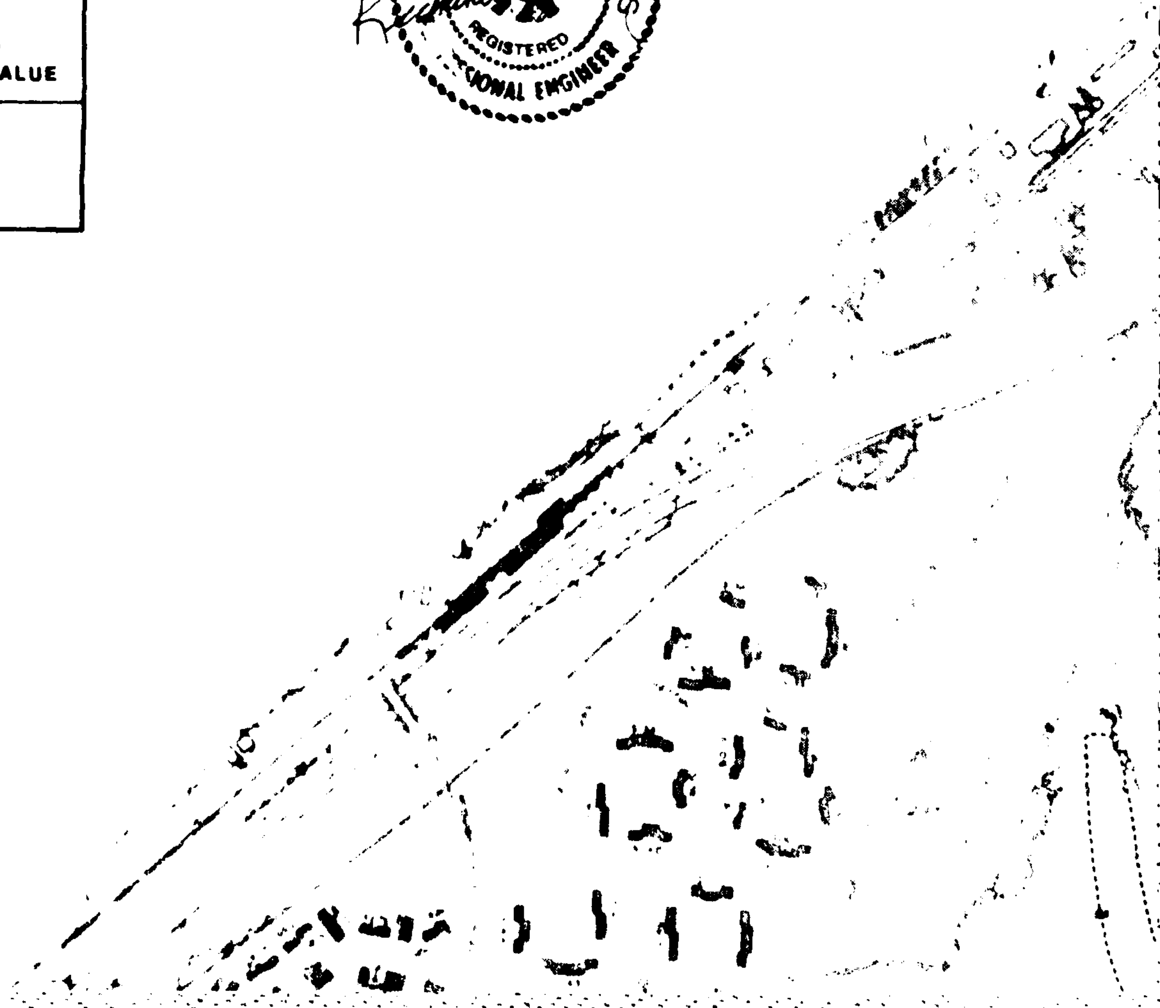


DIAGRAM FOR NUMERICAL VALUE ONLY

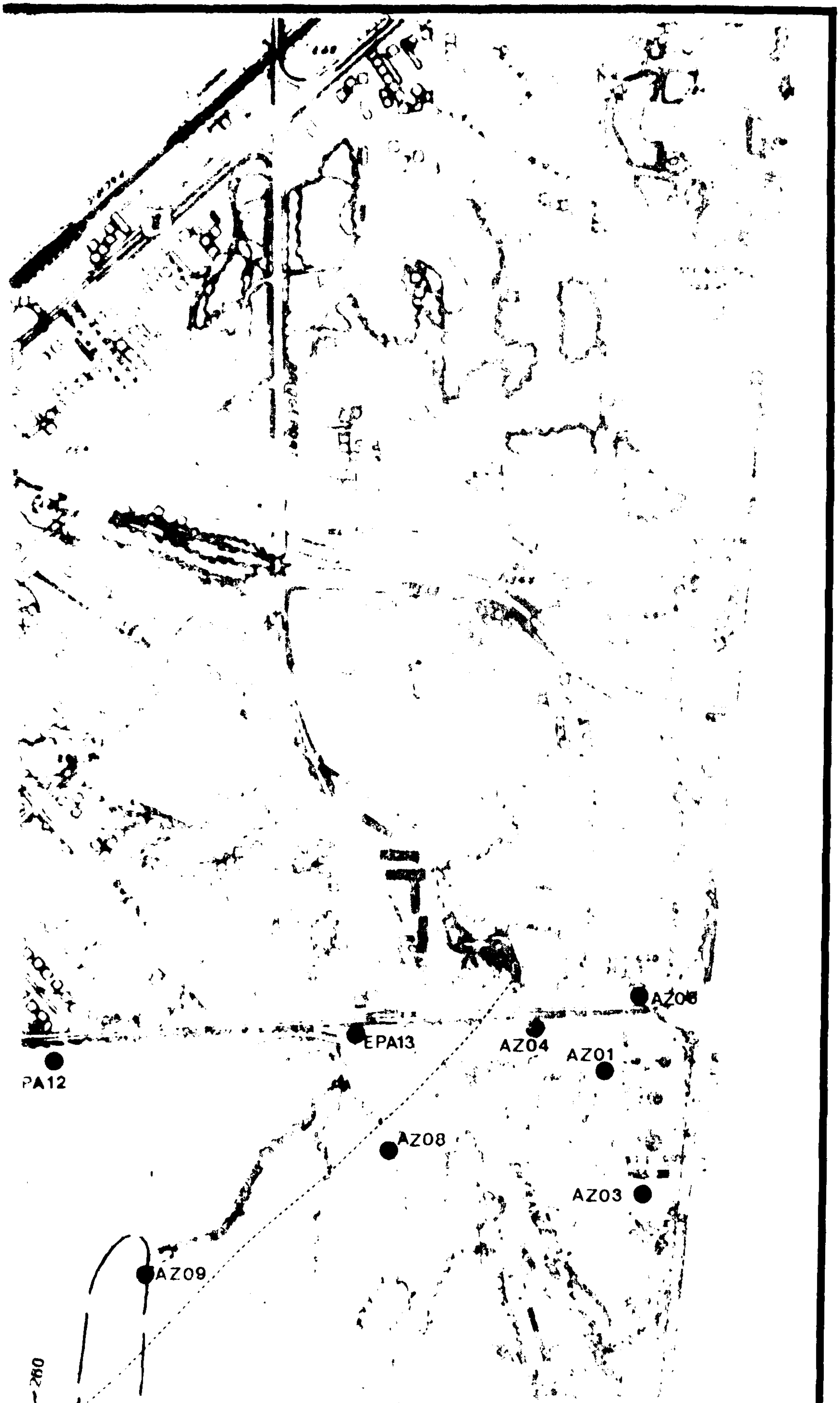
1000

T

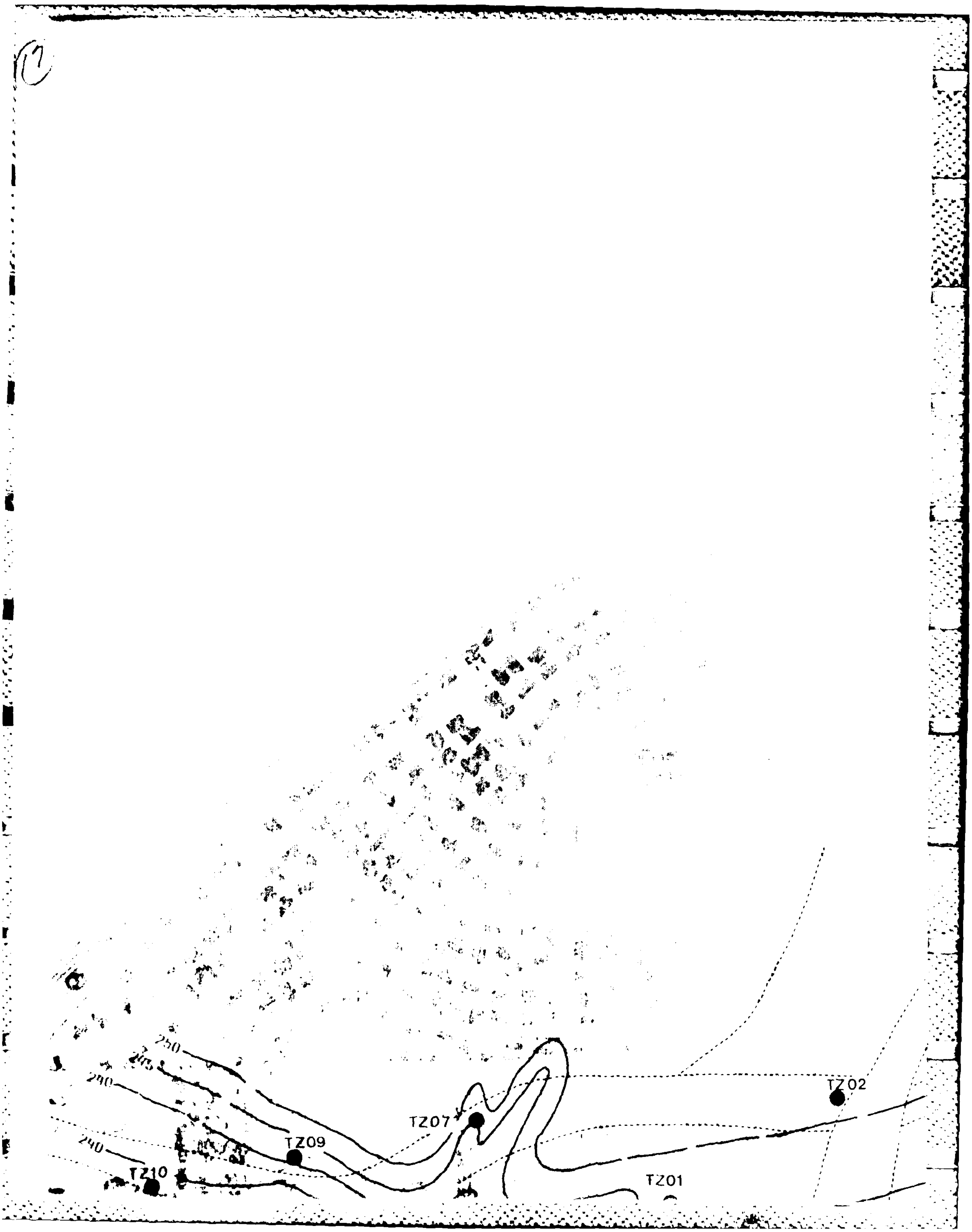
RICHARD W. GREINING
STATE OF WASHINGTON
REGISTERED
IONAL ENGINEER



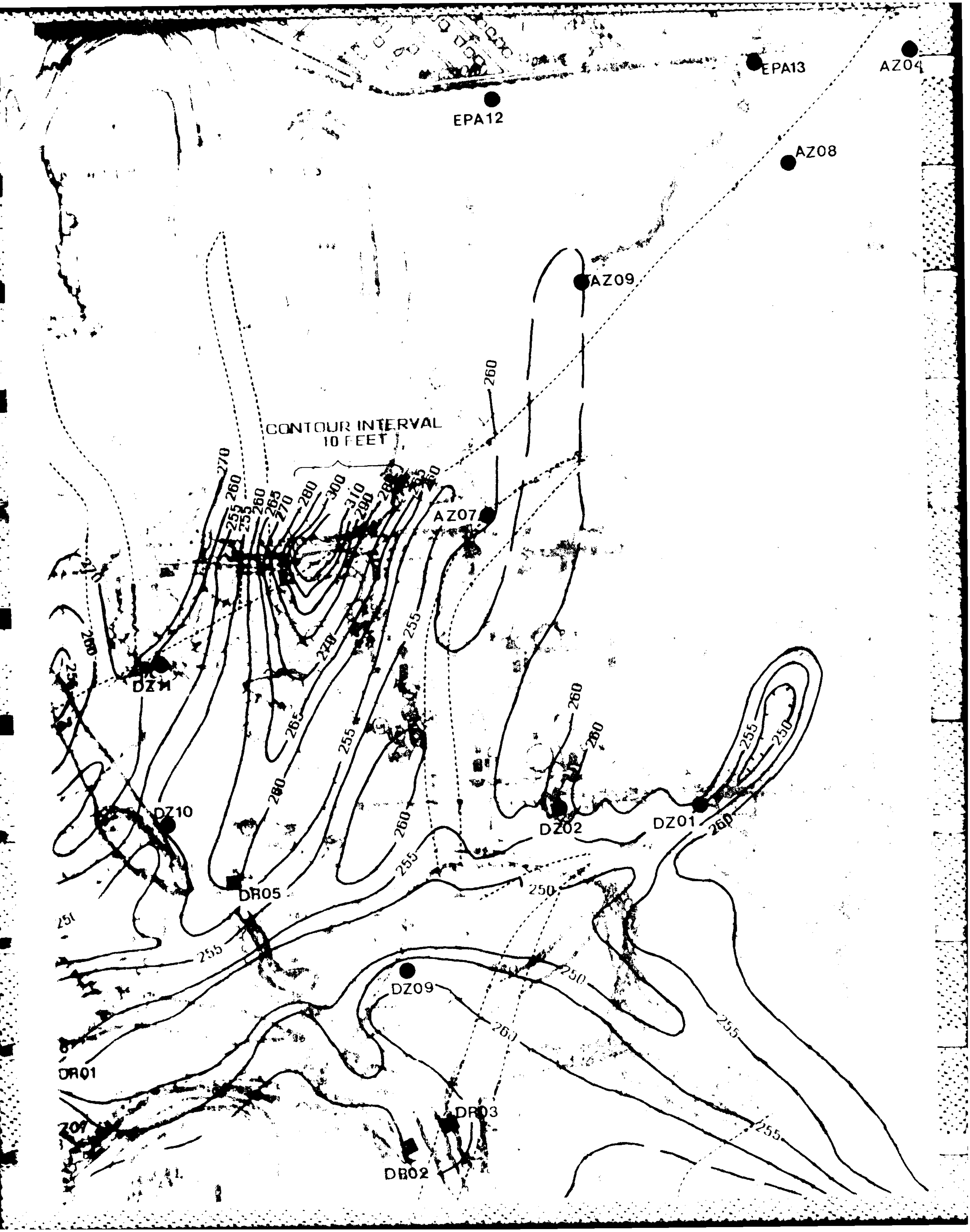
(4)
EPA12
AZ09
260

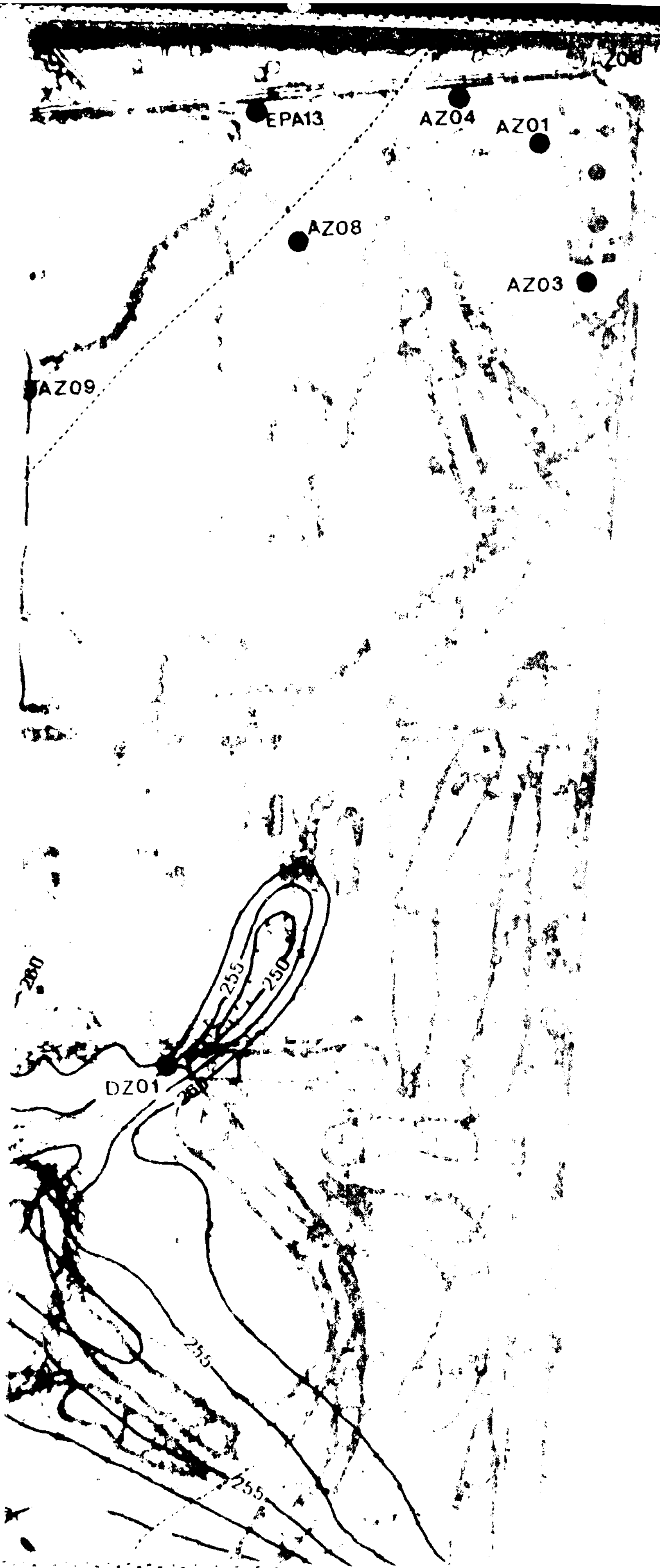

AZ06
AZ04
AZ01
EPA13
PA12
AZ08
AZ03
AZ09


250
245
240
TZ09
240
TZ10
245
250

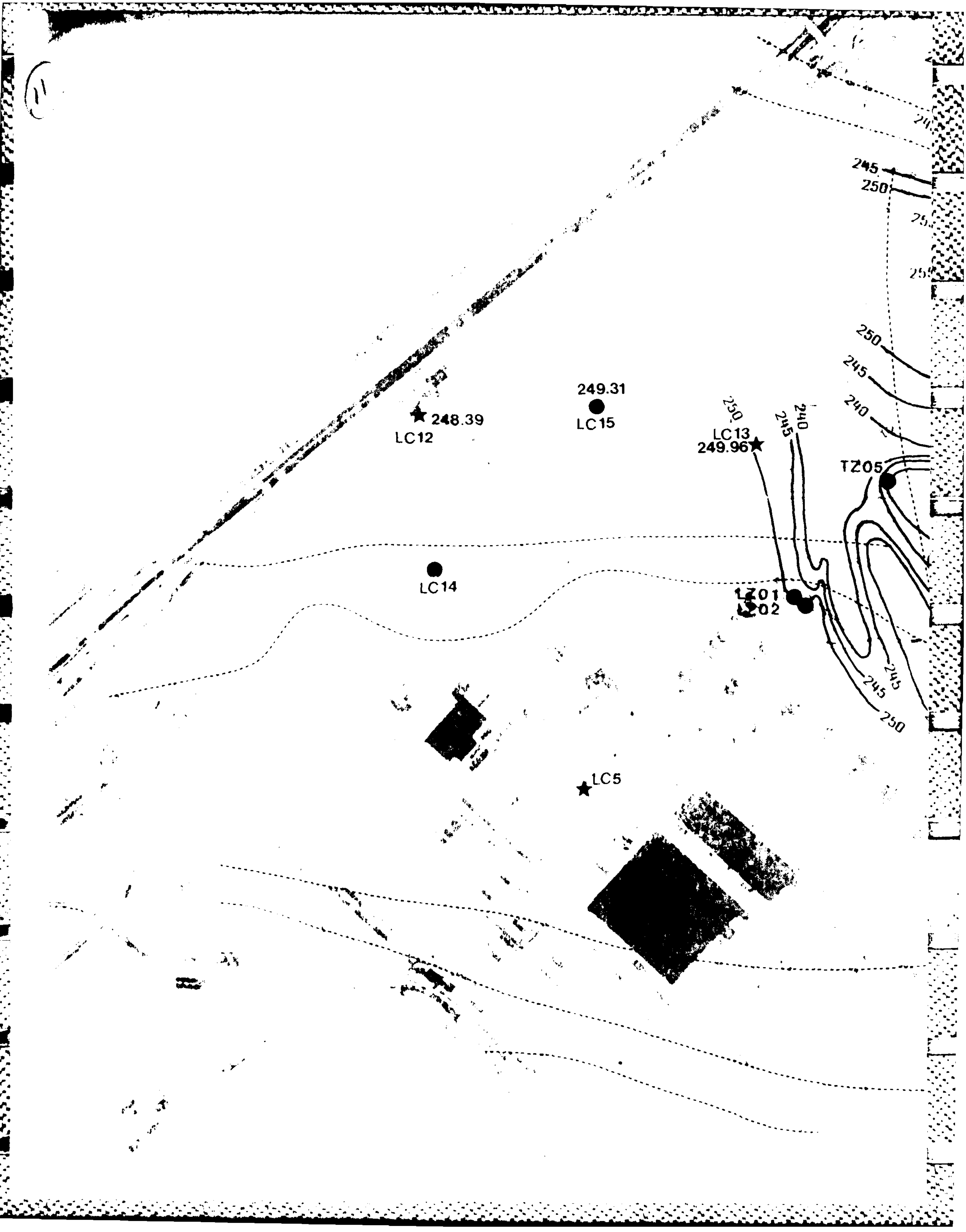

250
245
240
240
TZ10
TZ09
TZ07
TZ02
TZ01

270
270
260
255
DZ11
270
260
255
DZ08
DZ10
255
250
255
DZ03
DZ06
DR01
W 1
W 3
TZ02
250
DZ07
DZ13
DZ12
W 2
250
W-4
PZ01

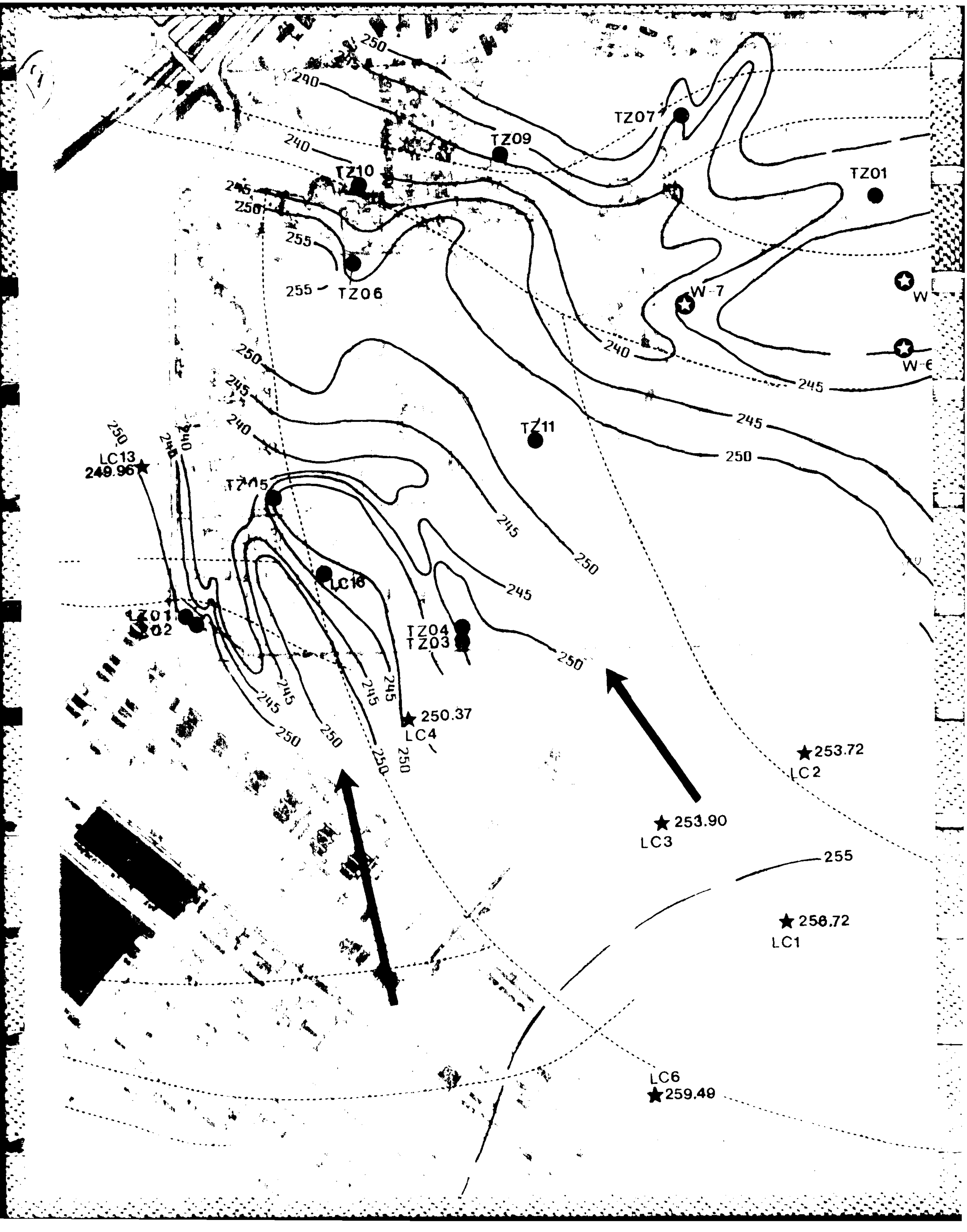

EPA12
EPA13
AZ04
AZ08
AZ09
CONTOUR INTERVAL
10 FEET
AZ07
DZ11
DZ10
DR05
DZ02
DZ01
DZ09
DR01
DR03
DR02
270
260
255
265
280
300
310
290
250



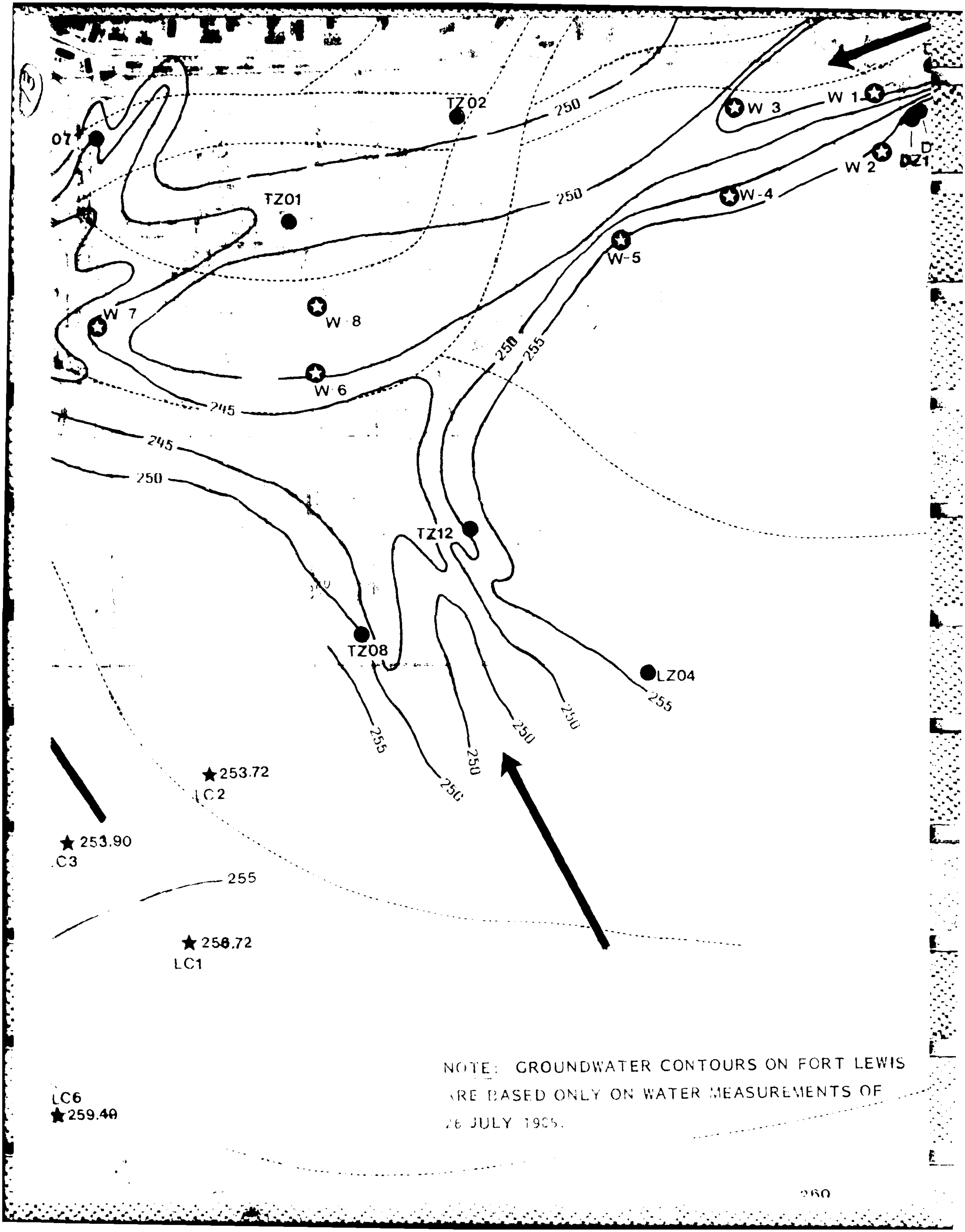
AZ06
EPA13
AZ04
AZ01
AZ08
AZ03
AZ09
260
255
250
DZ01
260
255
255



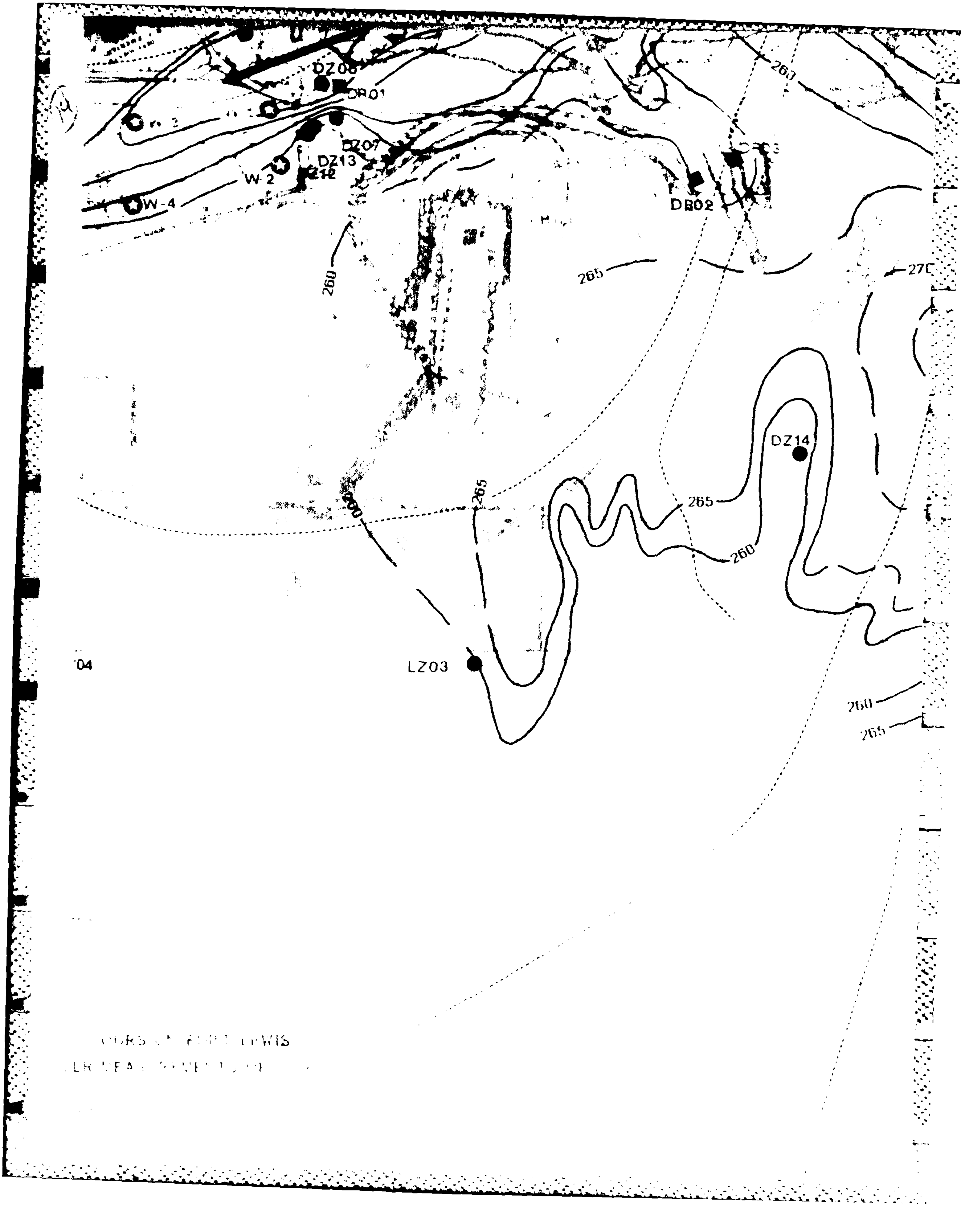
249.31
248.39
LC12
LC15
LC13
249.96
TZ05
LC14
LZ01
LZ02
LC5
245
250
240

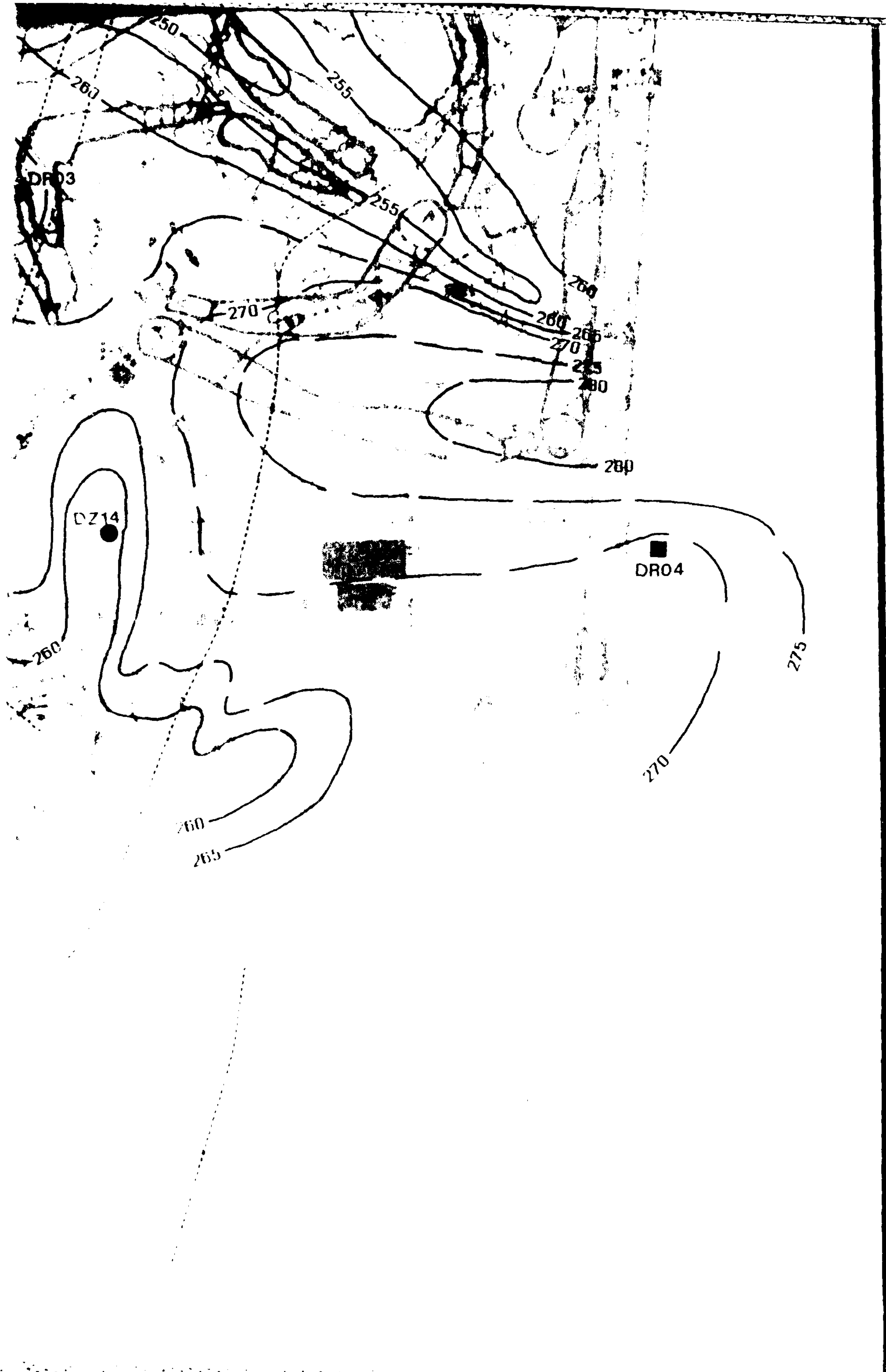


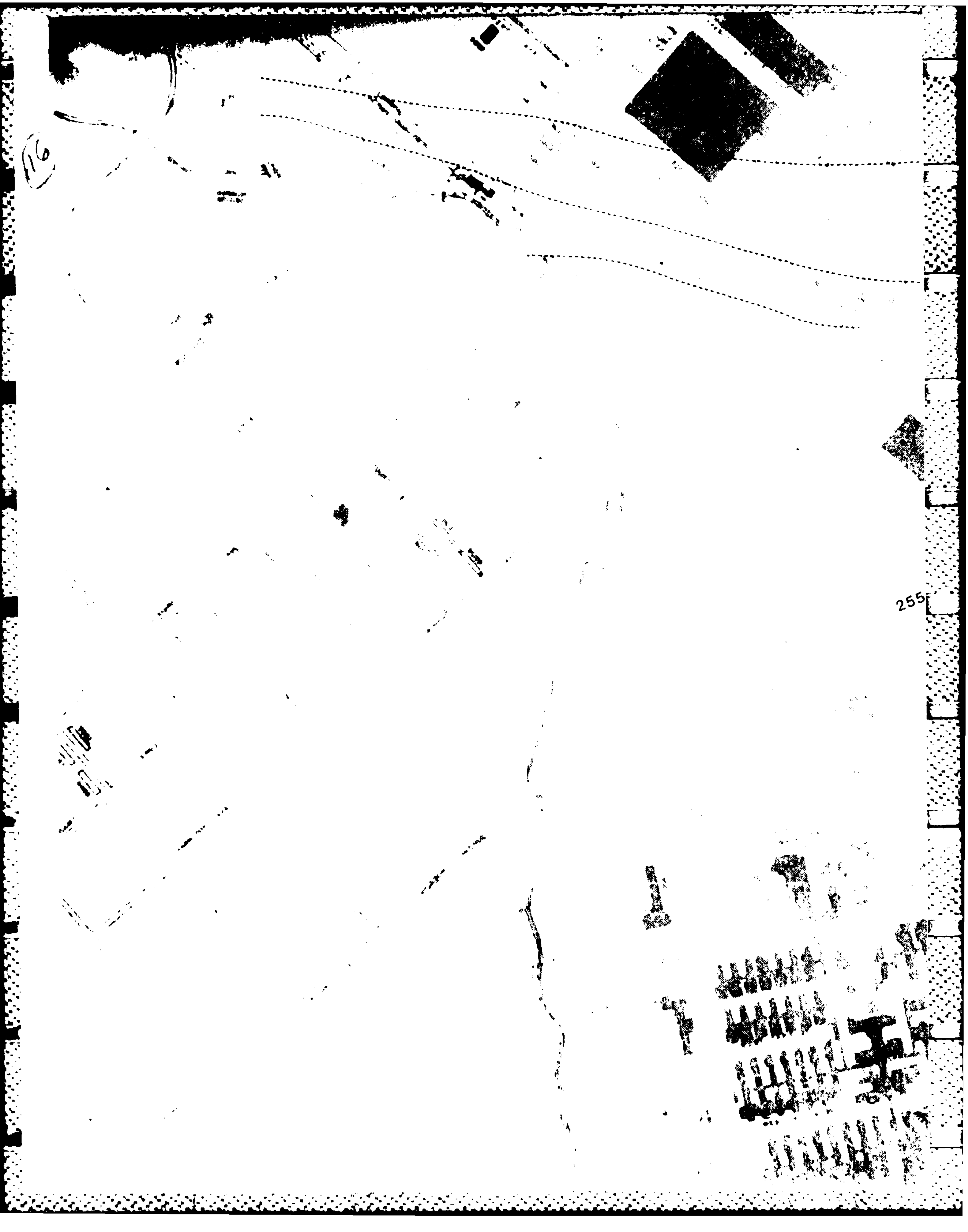
TZ07
TZ09
TZ10
TZ01
TZ06
W-7
W-6
TZ11
LC13
249.96
TZ15
LC16
TZ04
TZ03
250.37
LC4
253.72
LC2
253.90
LC3
256.72
LC1
LC6
259.49
240
245
250
255

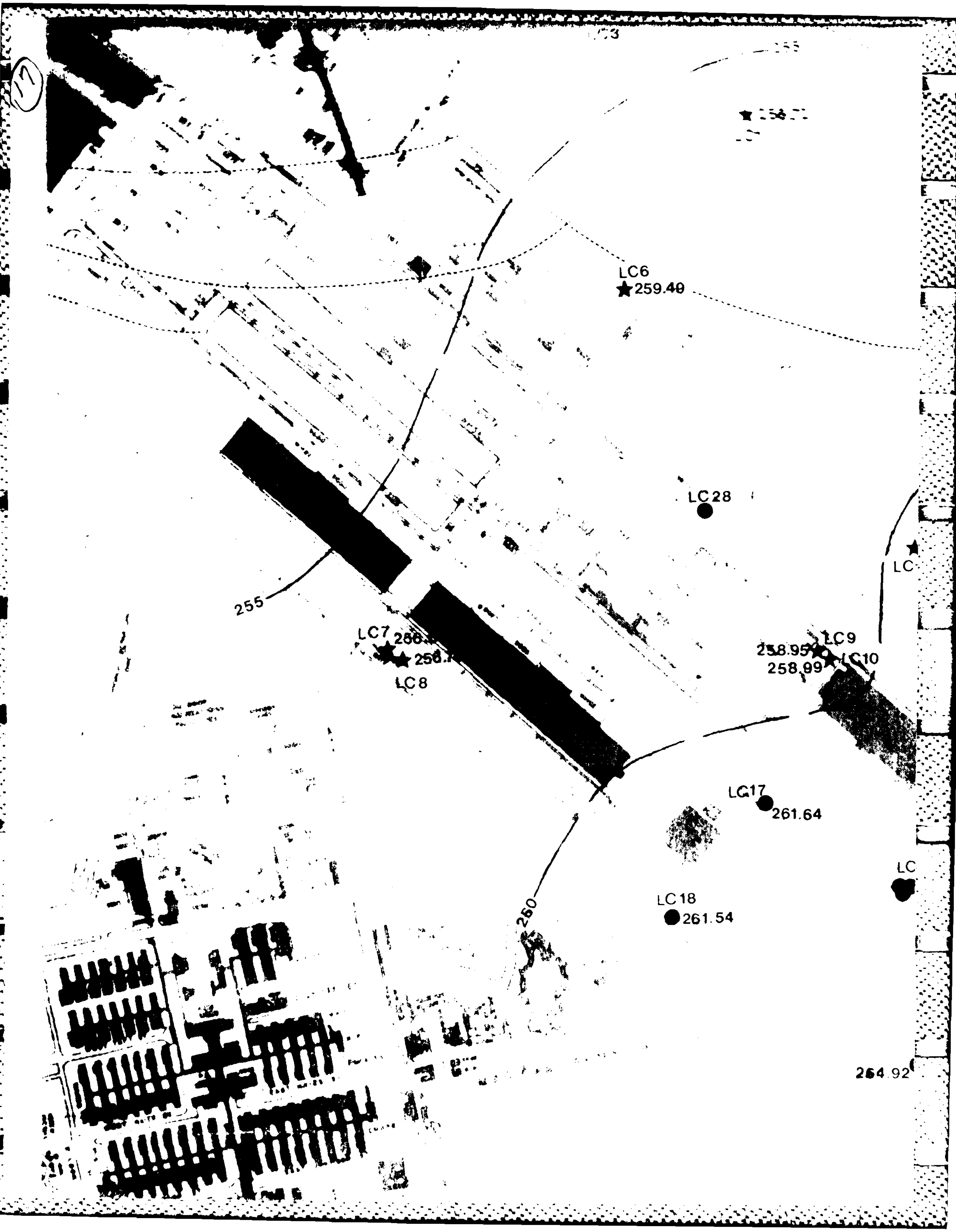


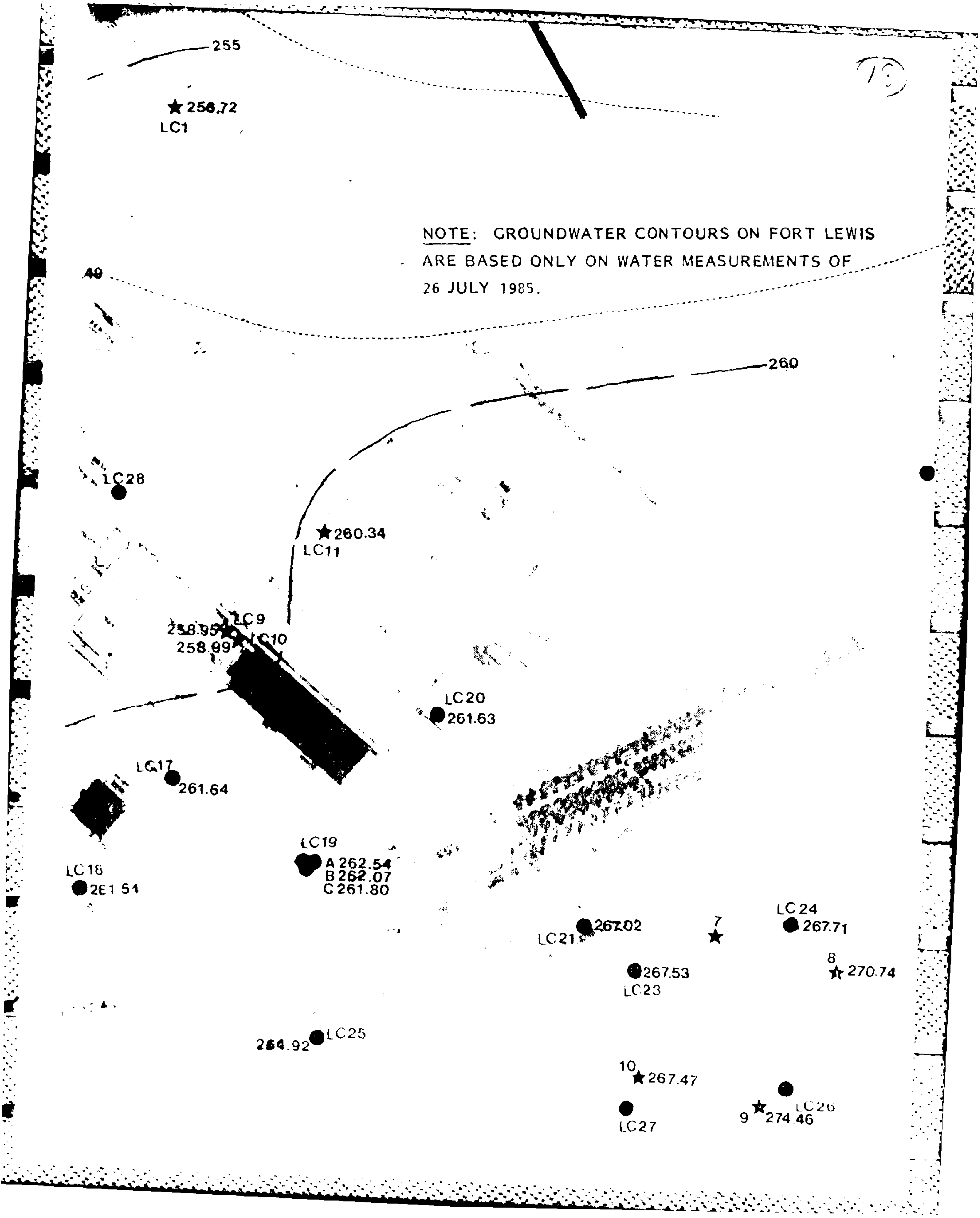
NOTE: GROUNDWATER CONTOURS ON FORT LEWIS ARE BASED ONLY ON WATER MEASUREMENTS OF 26 JULY 1985.


DZ06
DB01
DZ07
DZ13
W-2
W-4
DB02
260
265
270
DZ14
LZ03
04

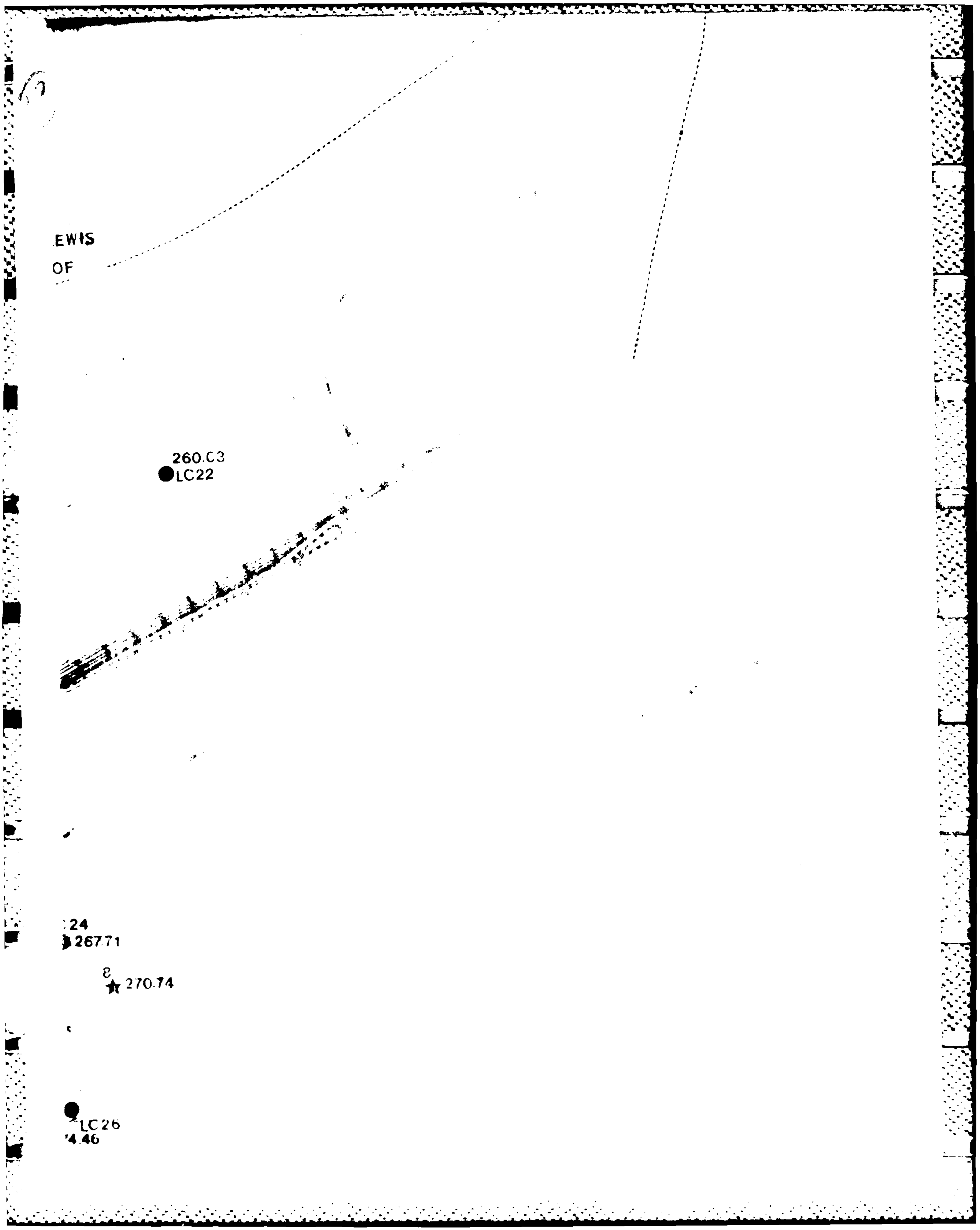

250
255
260
DR03
255
260
270
260
265
270
275
280
280
DZ14
DR04
260
275
270
260
265
12


116
255


17
LC6
259.40
LC 28
255
LC7
LC 8
258.95
LC9
LC10
258.99
LC17
261.64
LC 18
261.54
260
264.92

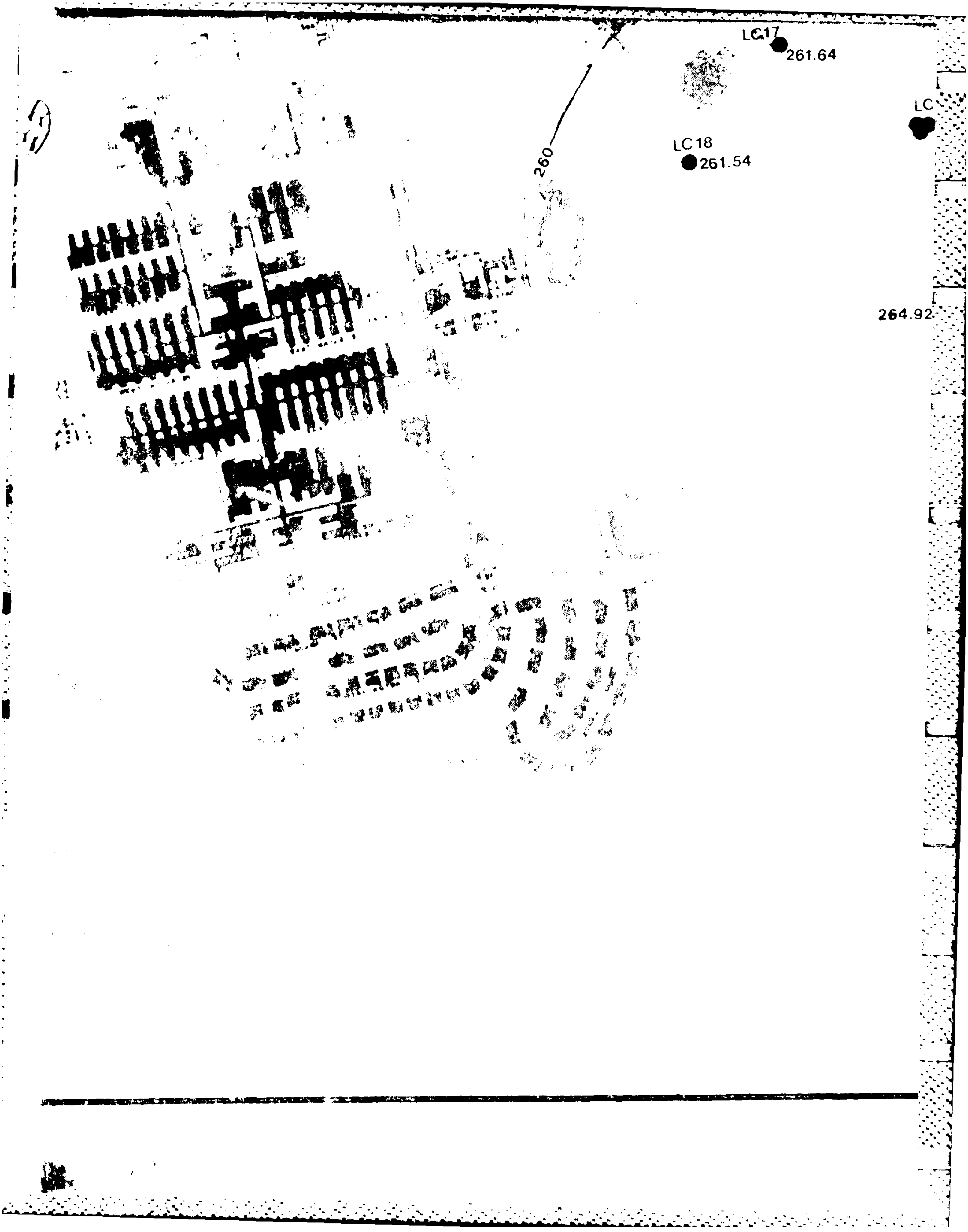


255
256.72
LC1
NOTE: GROUNDWATER CONTOURS ON FORT LEWIS
ARE BASED ONLY ON WATER MEASUREMENTS OF
26 JULY 1985.
40
260
LC28
260.34
LC11
LC9
258.95
LC10
258.99
LC20
261.63
LC17
261.64
LC19
A 262.54
B 262.07
C 261.80
LC18
261.51
LC21
267.02
7
LC24
267.71
8
270.74
267.53
LC23
264.92
LC25
10
267.47
LC27
9
274.46
LC26


EWIS
OF
260.C3
LC22
24
267.71
8
270.74
LC26
4.46

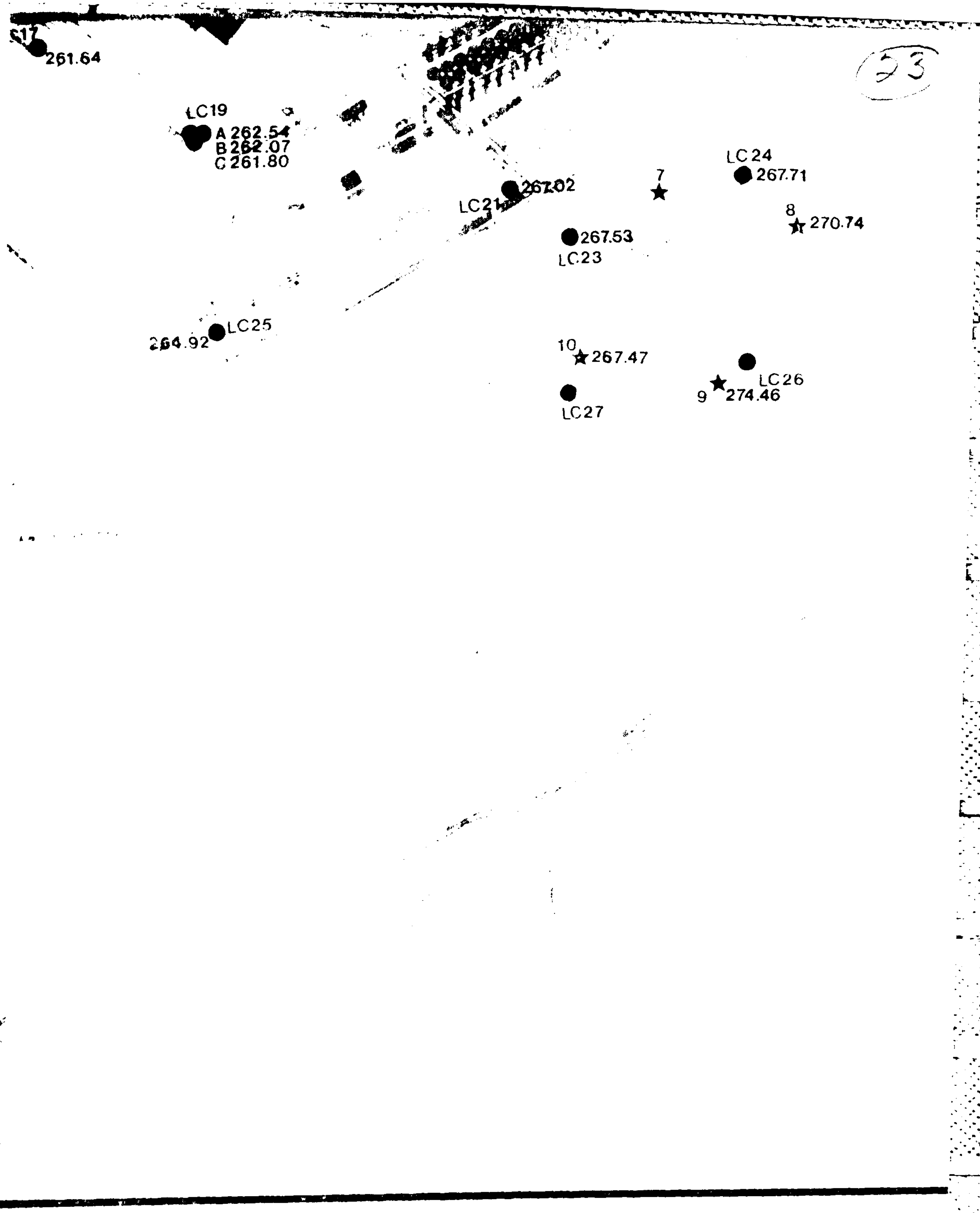
23


MAXIMUM



LC17
261.64
LC
LC18
261.54
260
264.92

23



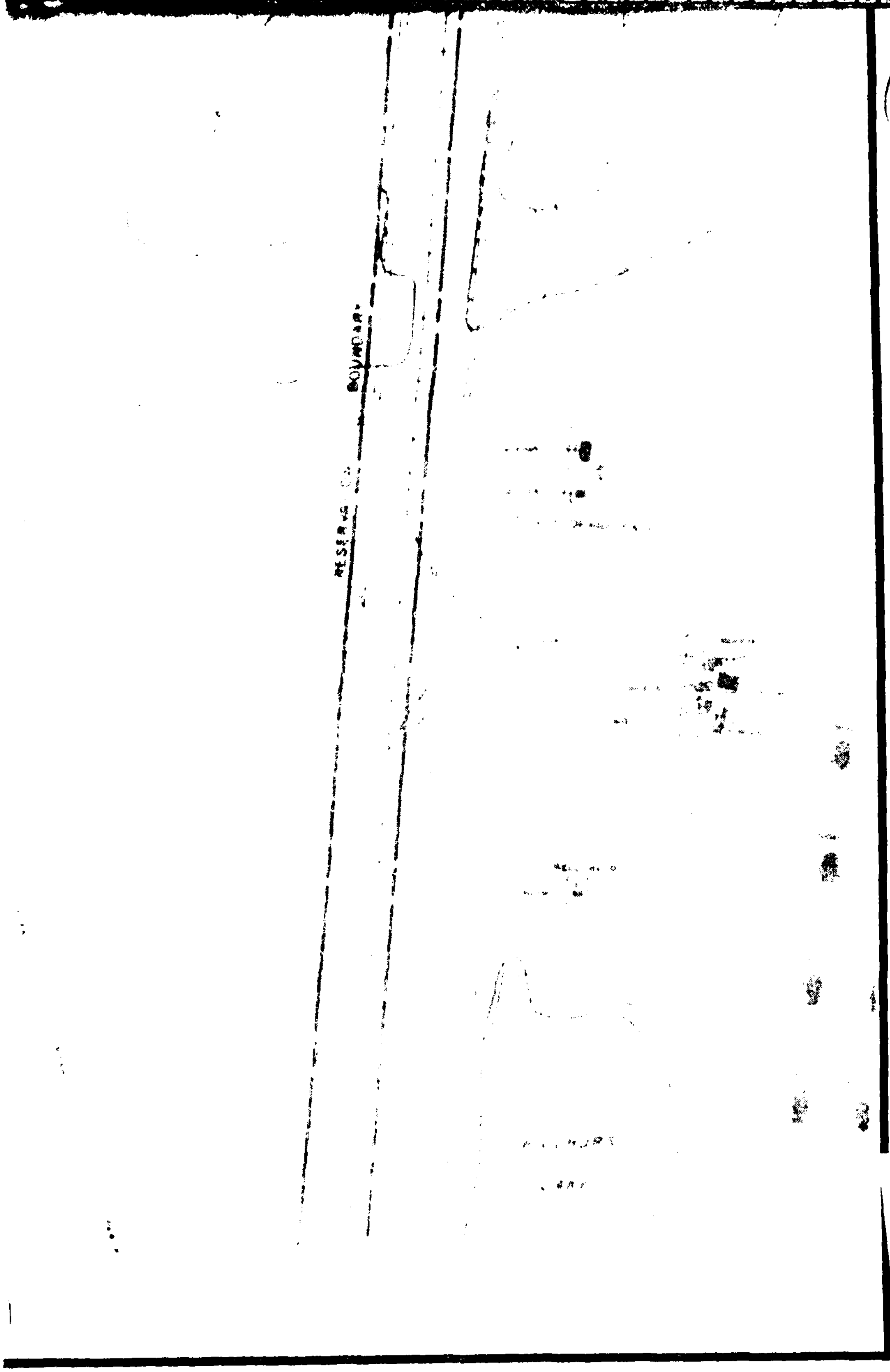
261.64
LC19
A 262.54
B 262.07
C 261.80
LC24
267.71
7
267.02
LC21
8
270.74
267.53
LC23
LC25
264.92
10
267.47
LC26
9
274.46
LC27

24
1267.71

8
270.74

LC26
4.46

25



SAIC Science Applications International Corporation
13400-B Northup Way, Suite 38, Bellevue, Washington 98005

PLATE 3 - RESIDUAL SELF POTENTIAL MAP IN THE
AMERICAN LAKE GARDEN TRACT STUDY AREA

Department of the Air Force
Occupational and Environmental
Health Laboratory
Brooks AFB, Texas

SCALE: As Shown	DRWN: JPD	DATE
SHEET: 1 of 1	CHCK: CP APPR: HLG	19 Sept 85

REVISIONS

REV	DATE		INT
1	12/10	Revise SP lines and contours.	CP

LEGEND

Self Potential Profile Line

Apparent Groundwater Flow Direction

+20 Self Potential Isoline

39 IRP Identified Waste Disposal Sites

Contour Interval = 20 mV

APPROXIMATE MAG. DEC.

True North

Magnetic North

21°E

DIAGRAM FOR NUMERICAL VALUE ONLY

500 0 500 1000

GRAPHIC SCALE IN FEET

INT

tic

UE

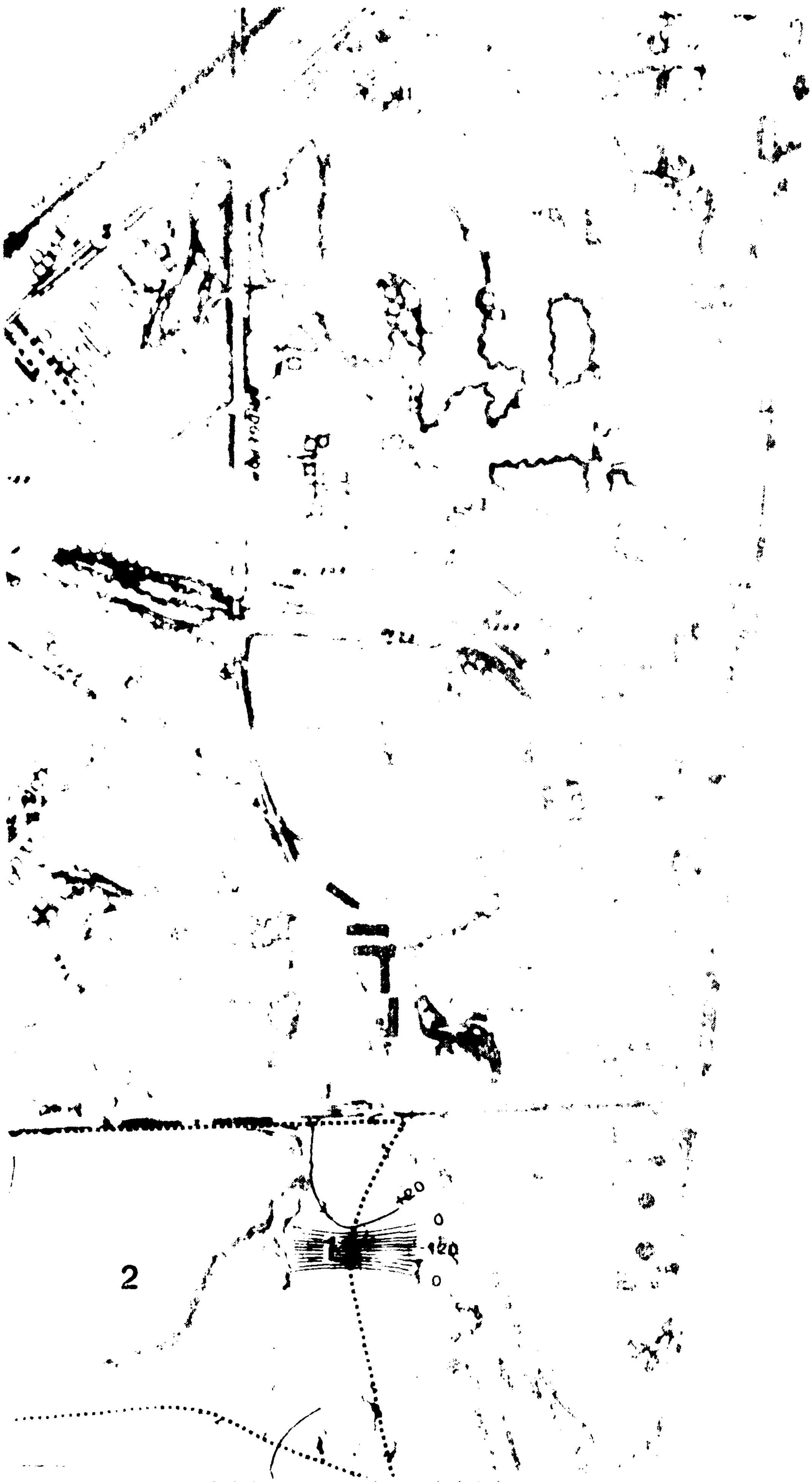
RICHARD W. GREILING
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

3

4

2

4



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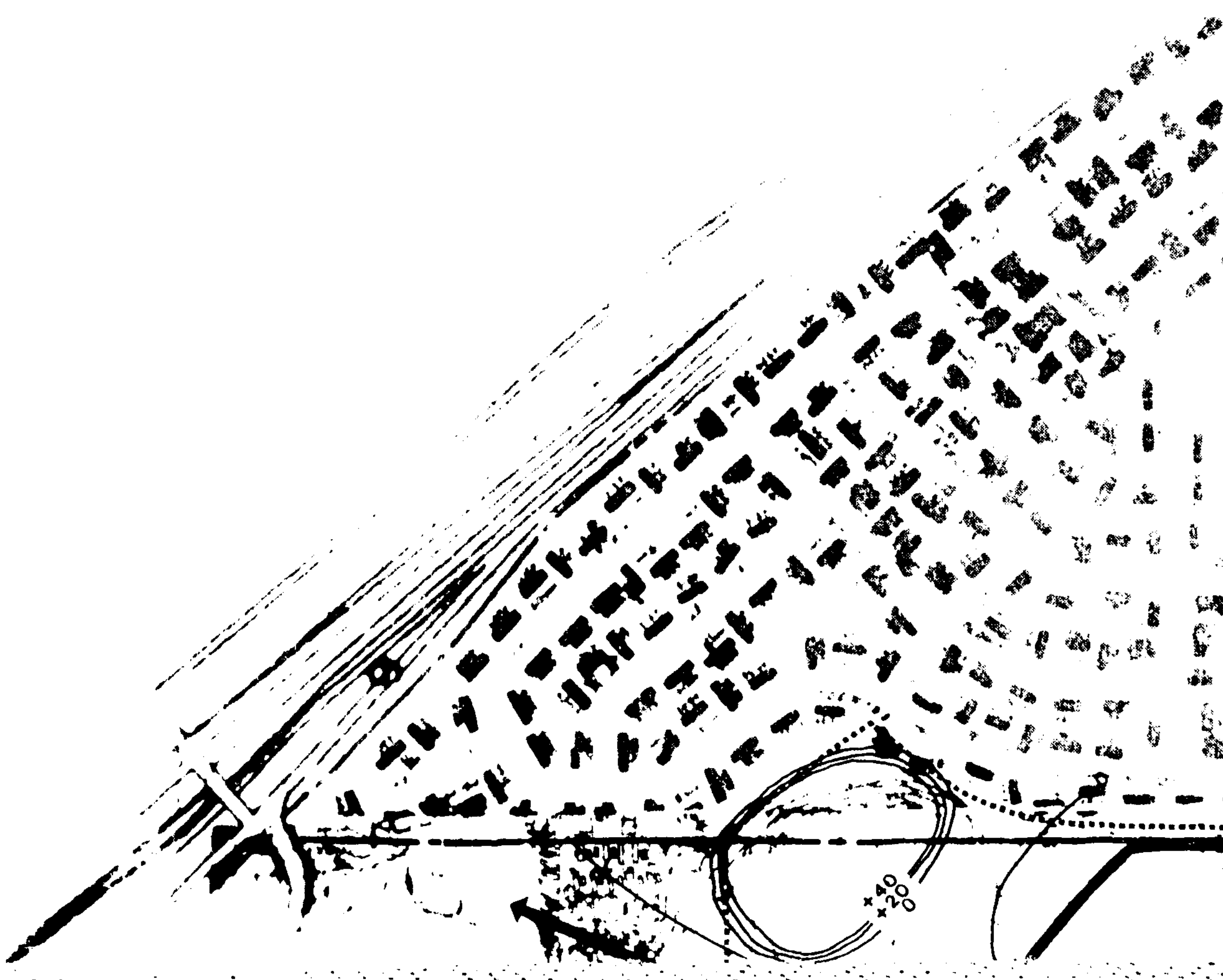
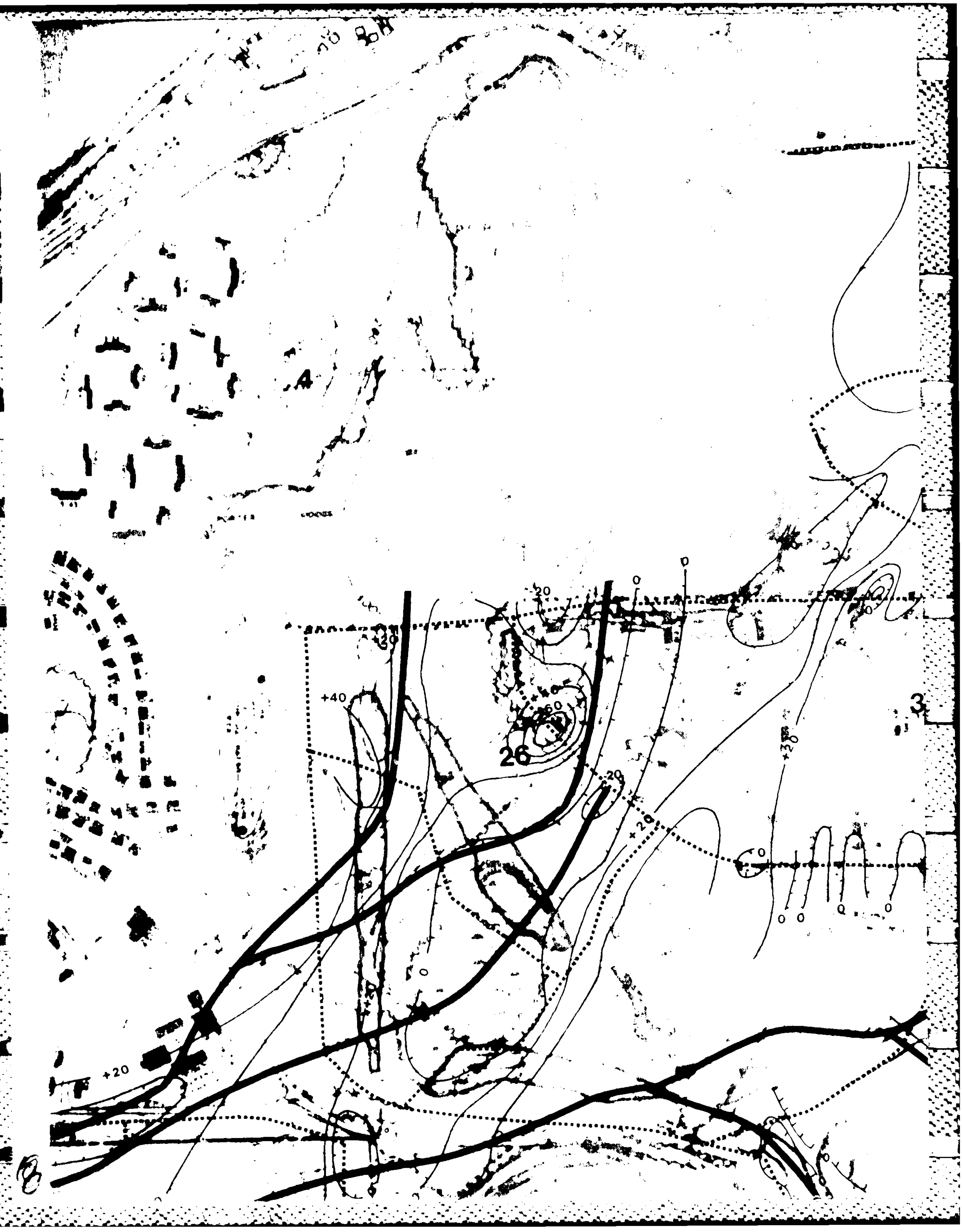
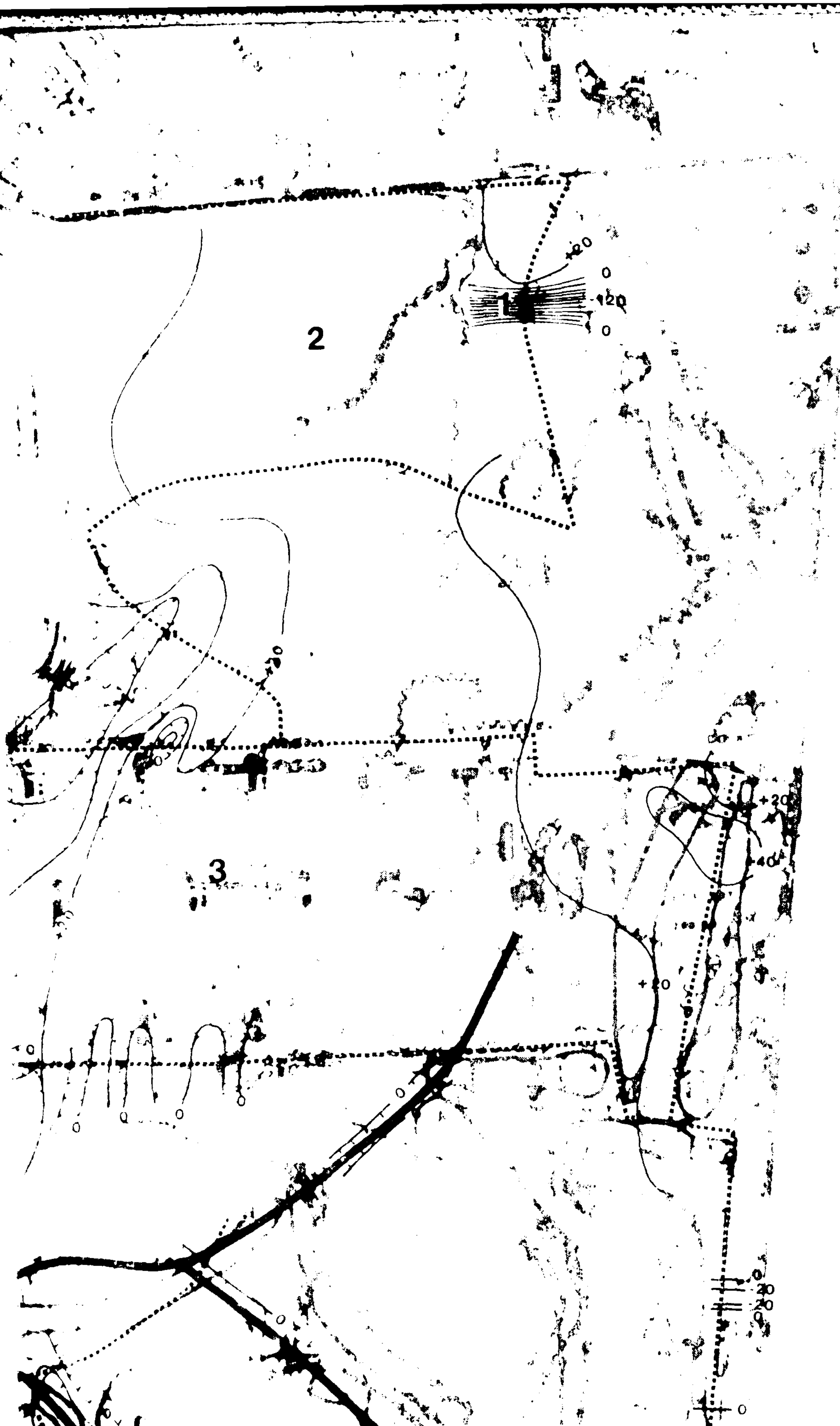
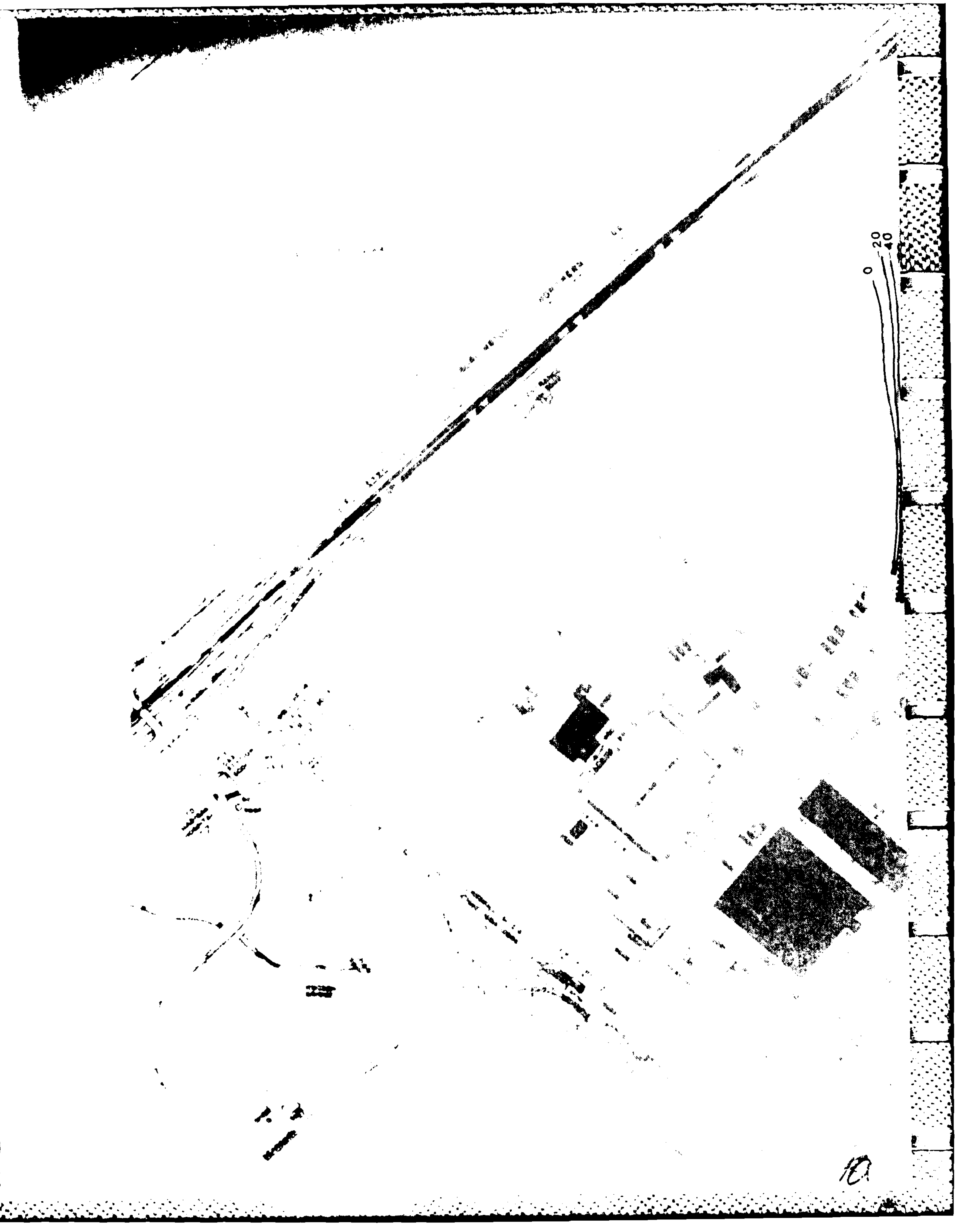

+40
+20
0


+20
0
+40
+20
0
+20

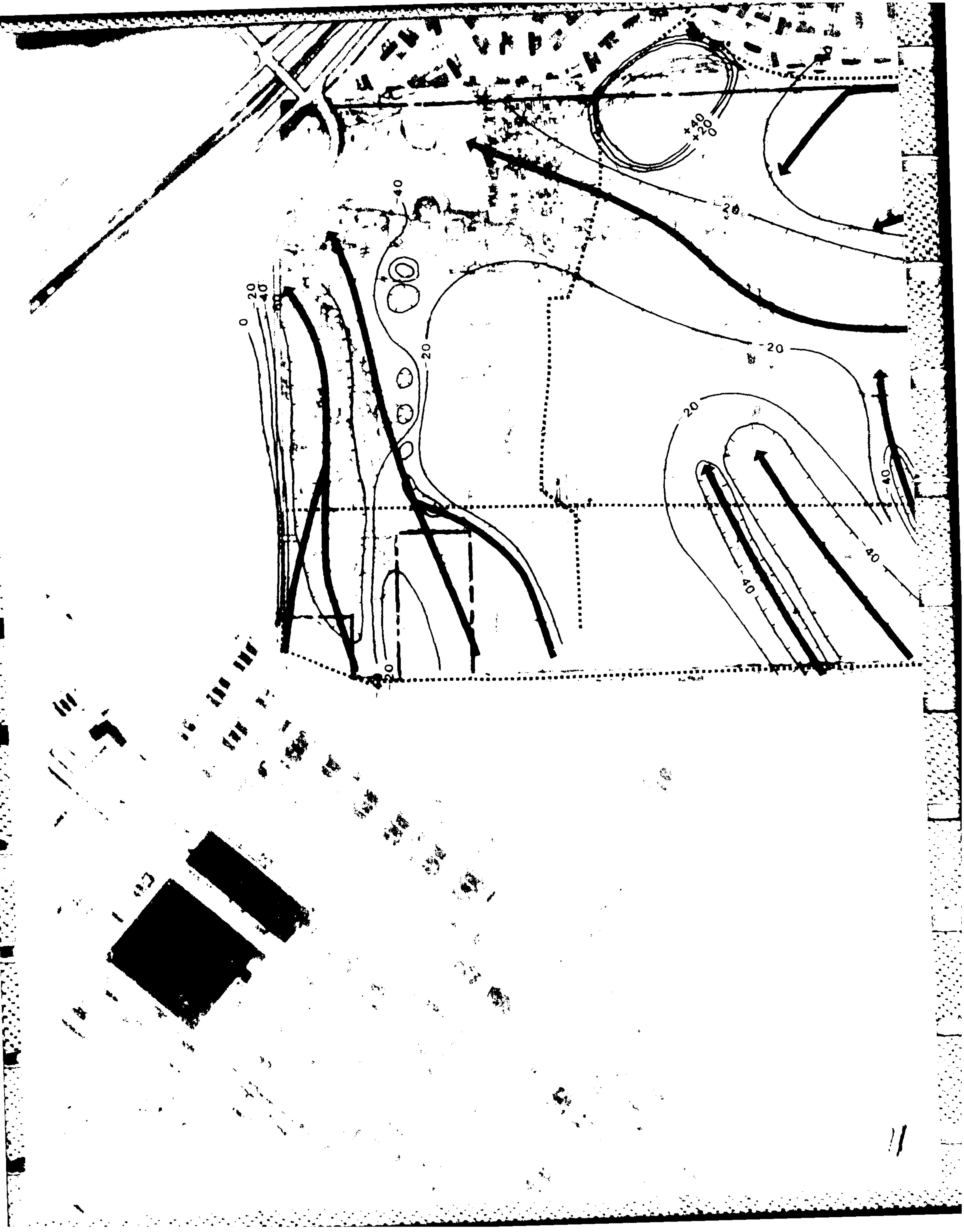


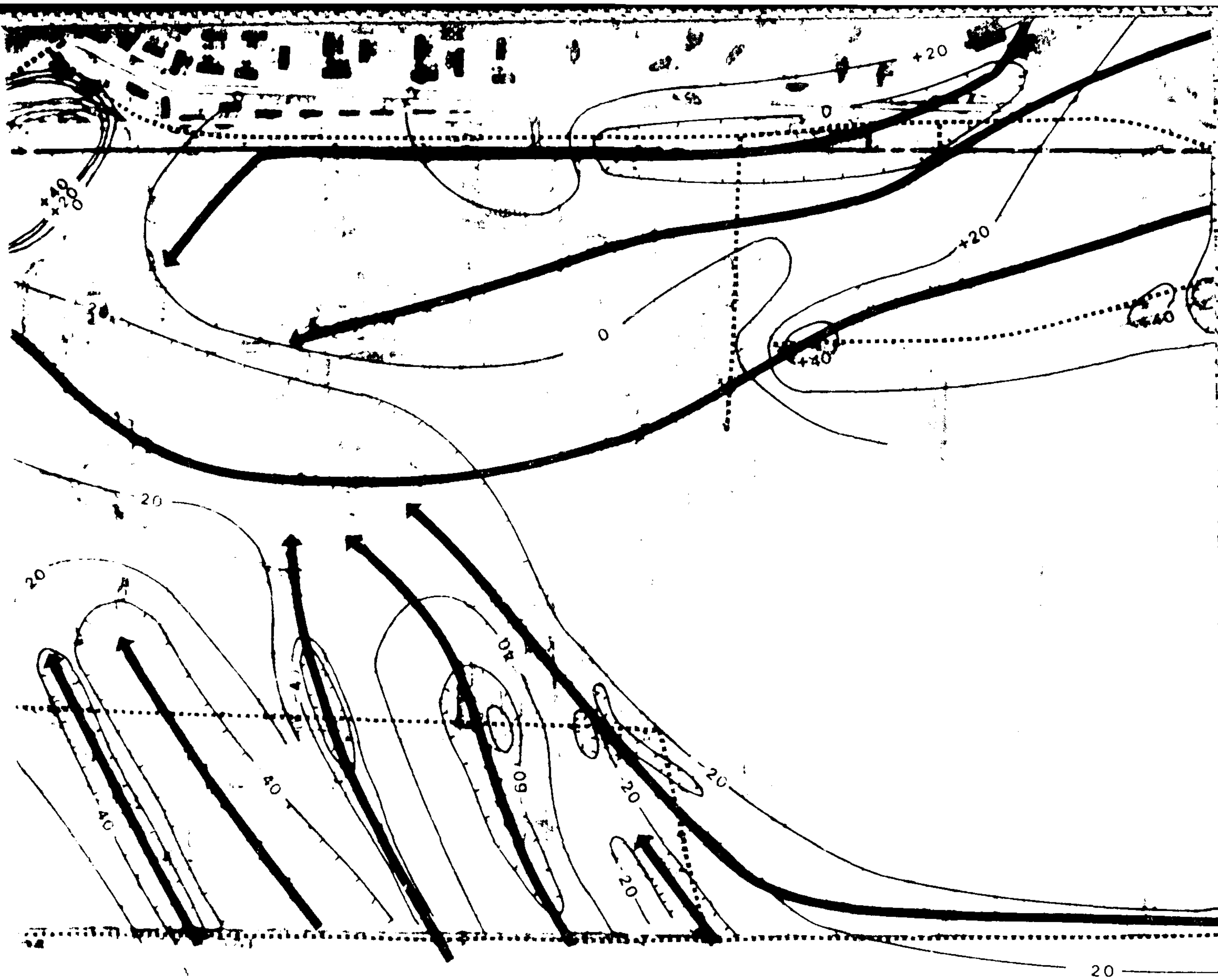
+40
26
+20
+20
0
3

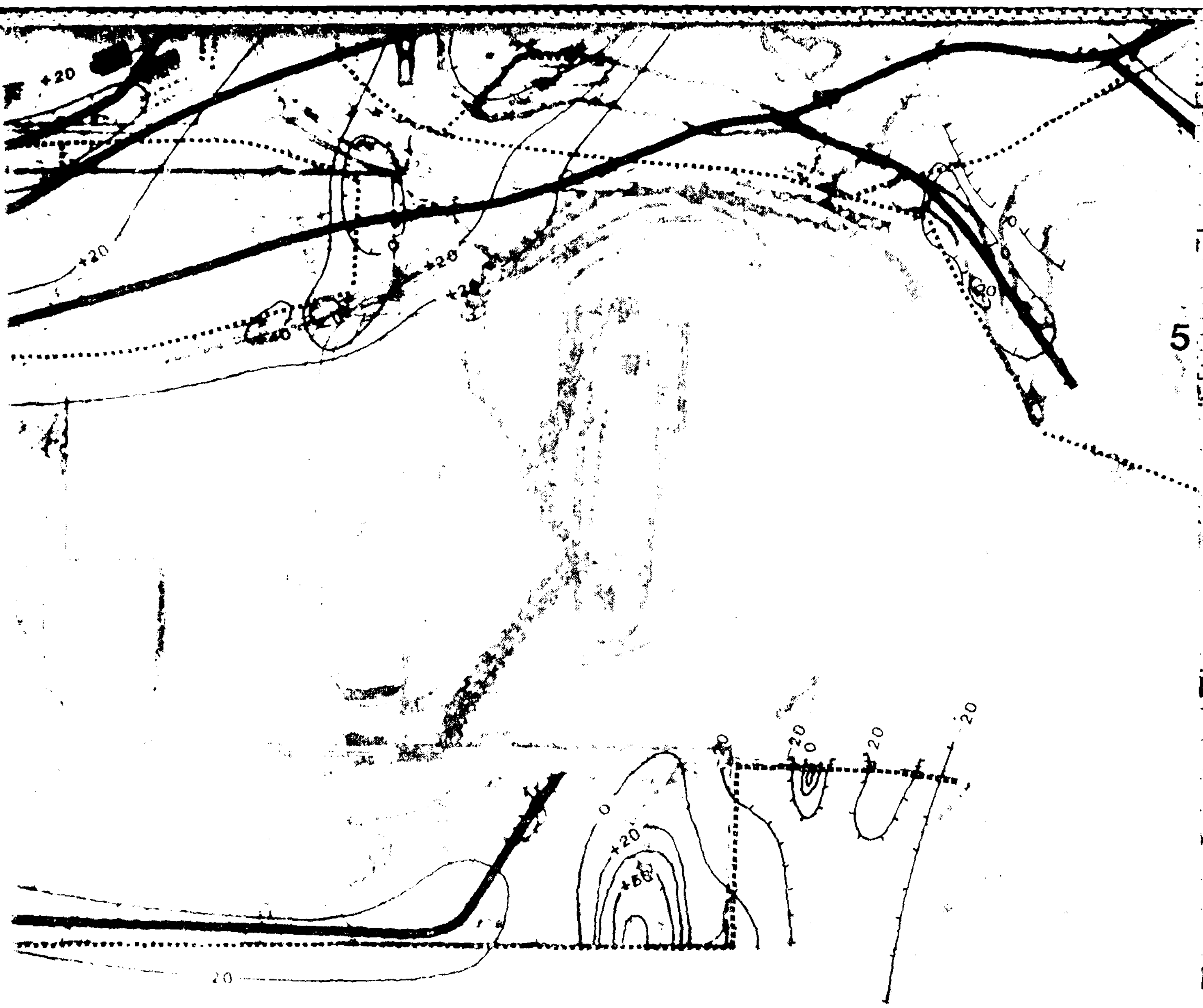

1
2
3
+20
40

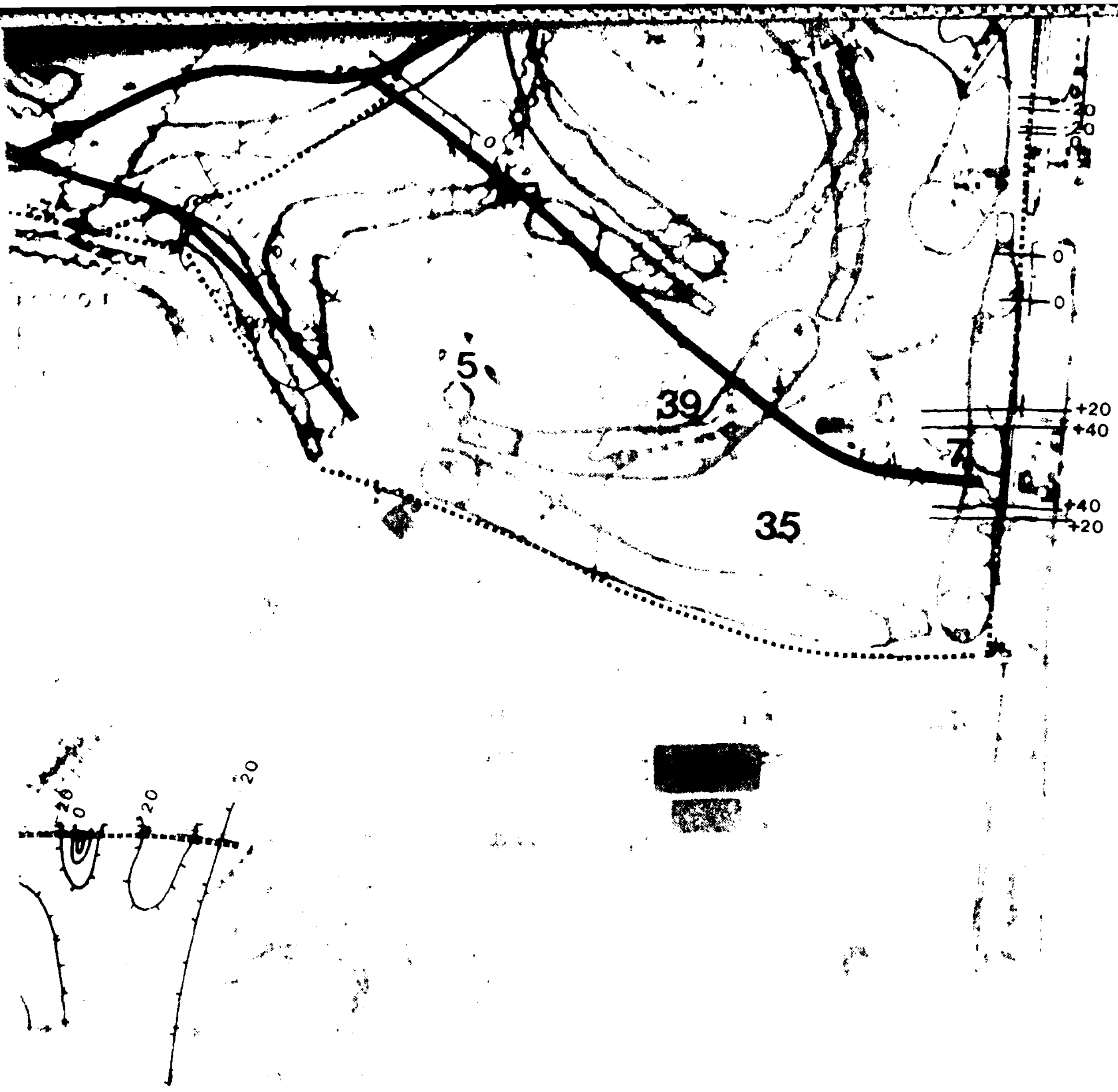


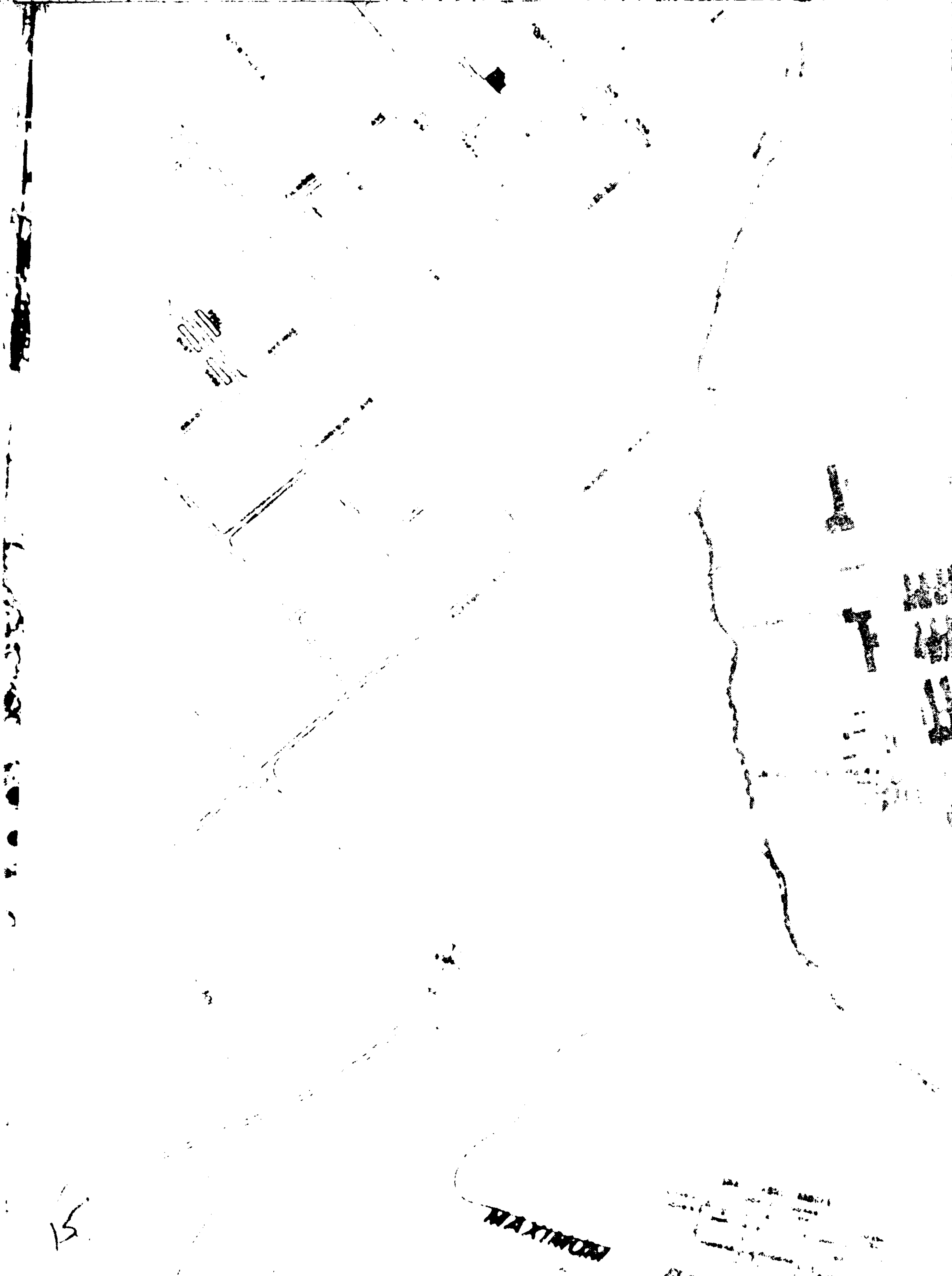
10


+40
+20
0
20
40
0
20
40
20
20
20
40
40
40
20
20
0


+20
0
+40
+20
+20
0
+40
+40
20
20
40
40
60
20
20
20
20

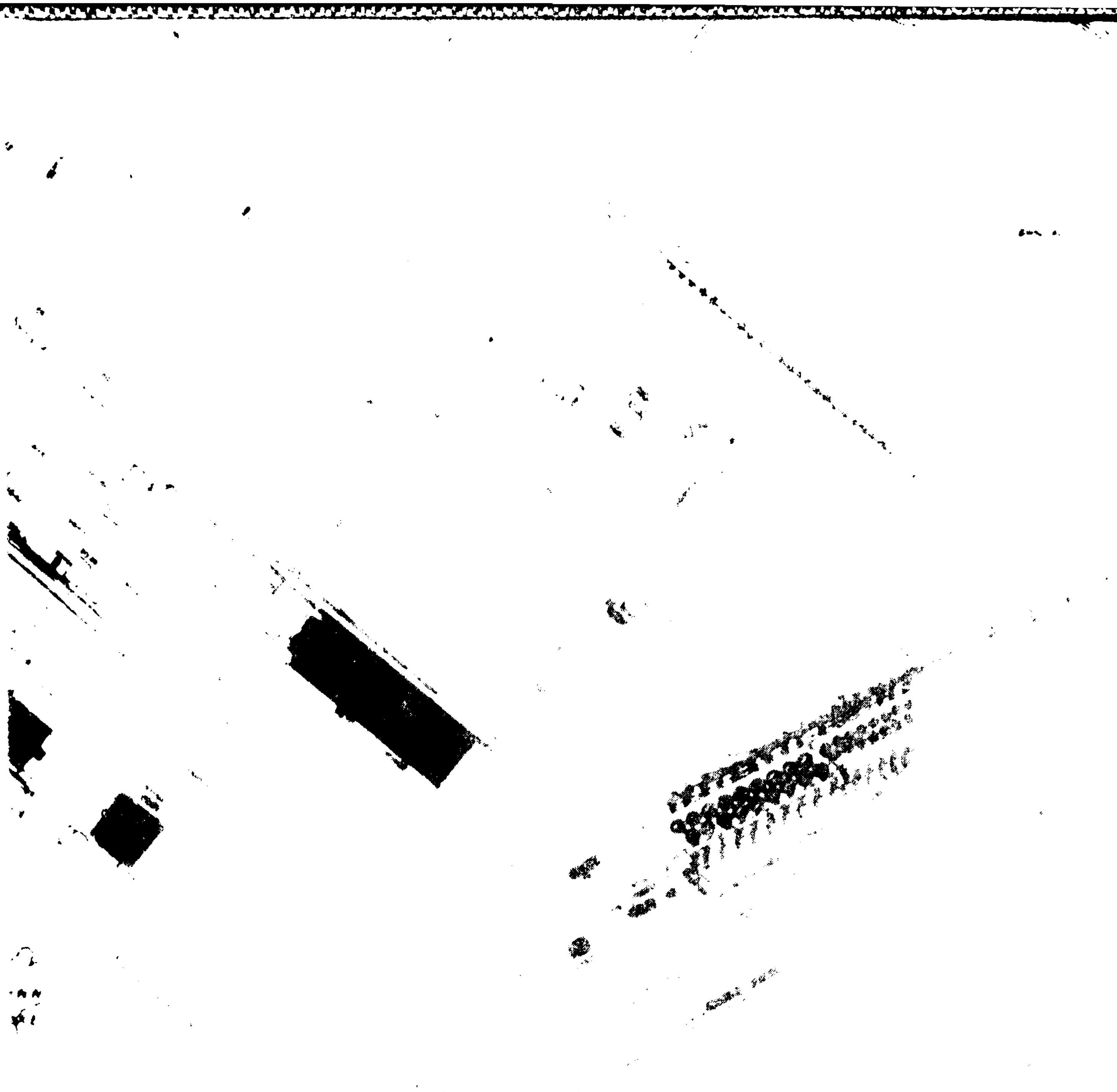

+20
+20
20
0
+50
5


5
39
35
+20
+40
+40
+20
0
0
20
20



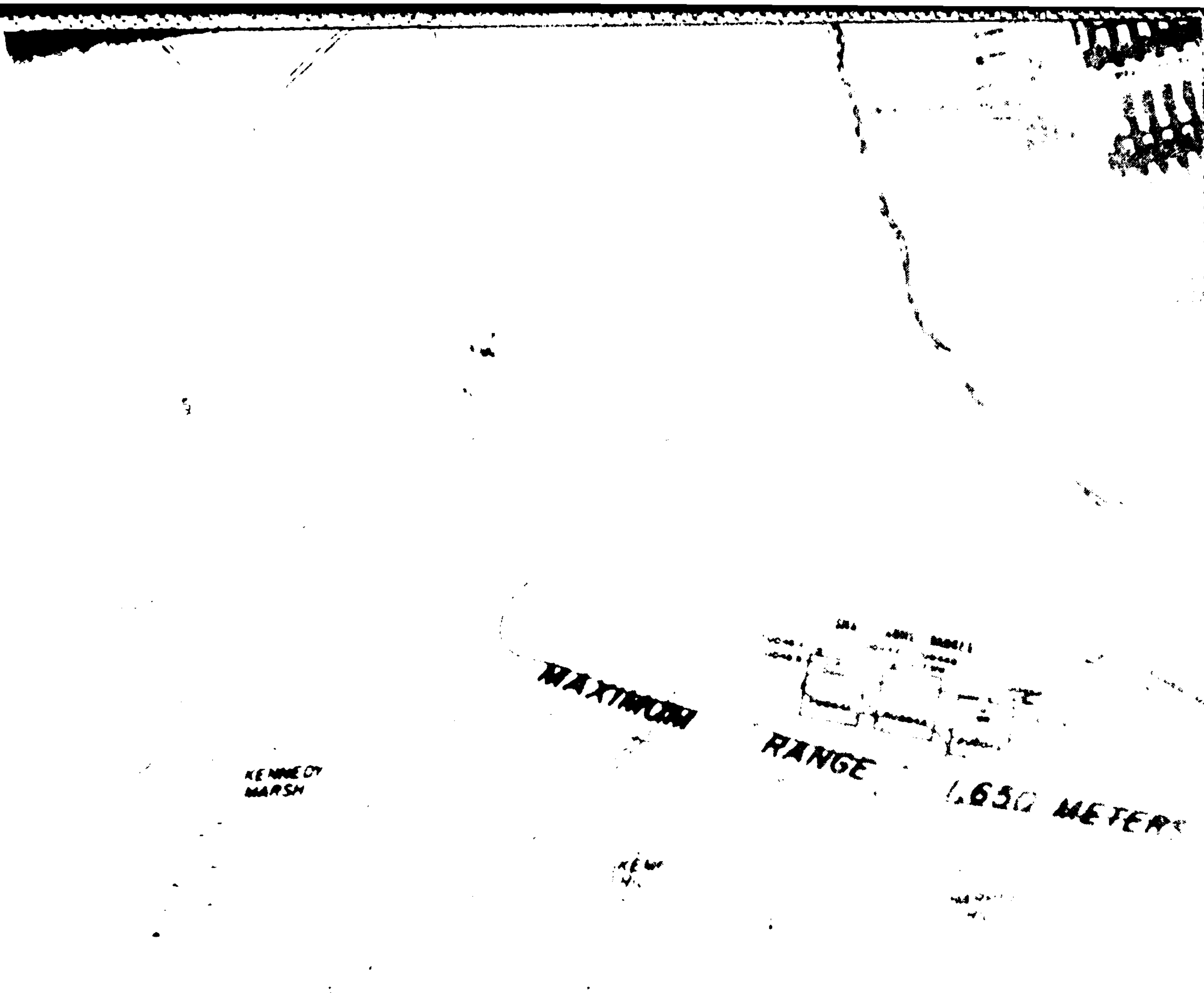
15

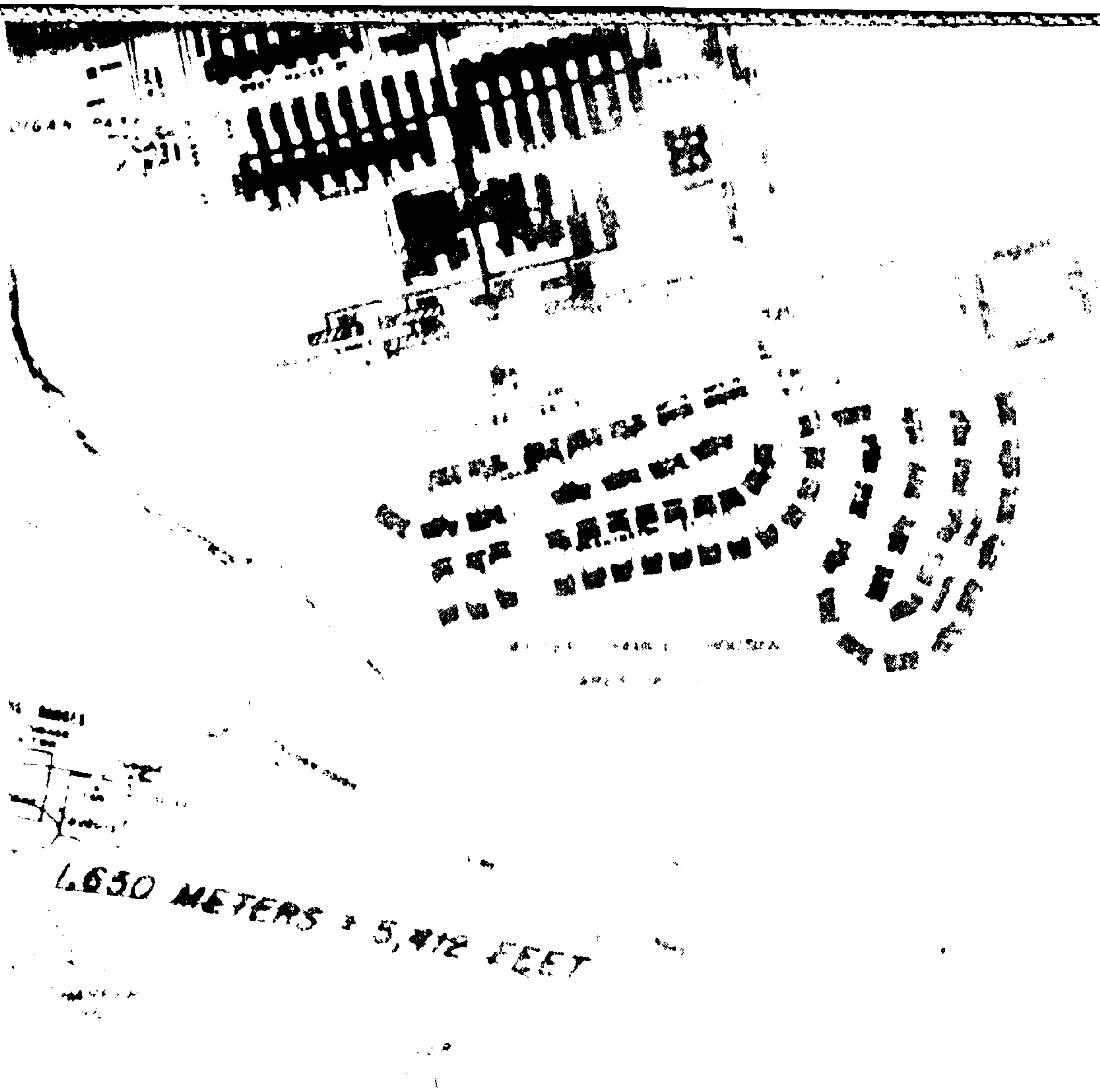
6



17

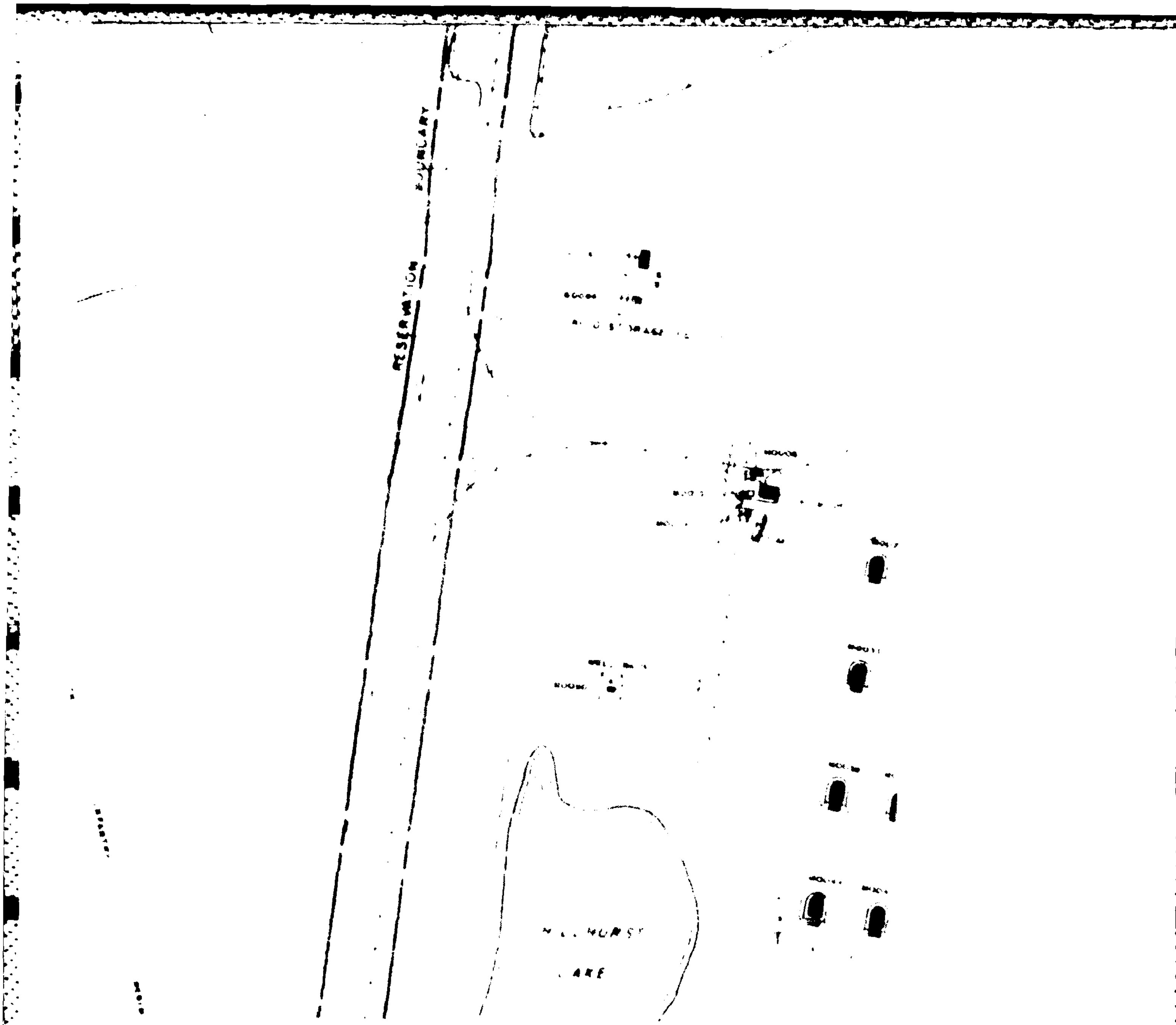
18


MAXIMUM
RANGE
KENNEDY
MARSH


1.650 METERS = 5,412 FEET

17

3



27

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PLATE 4 SPATIAL DISTRIBUTION OF VOLATILE ORGANIC CHEMICALS IN GROUNDWATER AT THE AMERICAN LAKE GARDEN TRACT STUDY AREA, JUNE JULY, 1985

Department of the Air Force
Occupational and Environmental Health Laboratory
Brooks AFB, Texas

SCALE	As Shown	DRWN		DATE
		CHCK		
SHEET	1 of 1	APPR		15 Aug 85

REVISIONS			
REV	DATE		INT
1	9 19	ALGT boundary, histogram additions.	

nal Corporation

VOLATILE
R AT THE
AREA,

VISIONS

	INT
boundary, histo- additions.	

LEGEND

● 2" ID Monitoring Well ● Domestic Wells
■ 6" ID Observation Well
EPA Nested Well
★ 4" ID Monitoring Well
1,2 Trans dichloroethylene
Trichloroethylene
Benzene
Other Volatile Organic Compounds
Specific Conductance Isoline (µmhos cm)

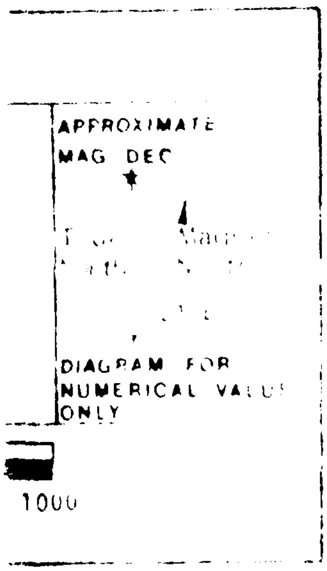
APPROXIMATE
MAG DEC

True North
Magnetic North

DIAGRAM FOR NUMERICAL VALUE ONLY

500 0 500 1000

GRAPHIC SCALE IN FEET



HARD W. GRE
OF WASHI
REGISTERED
PROFESSIONAL ENGINEER

4

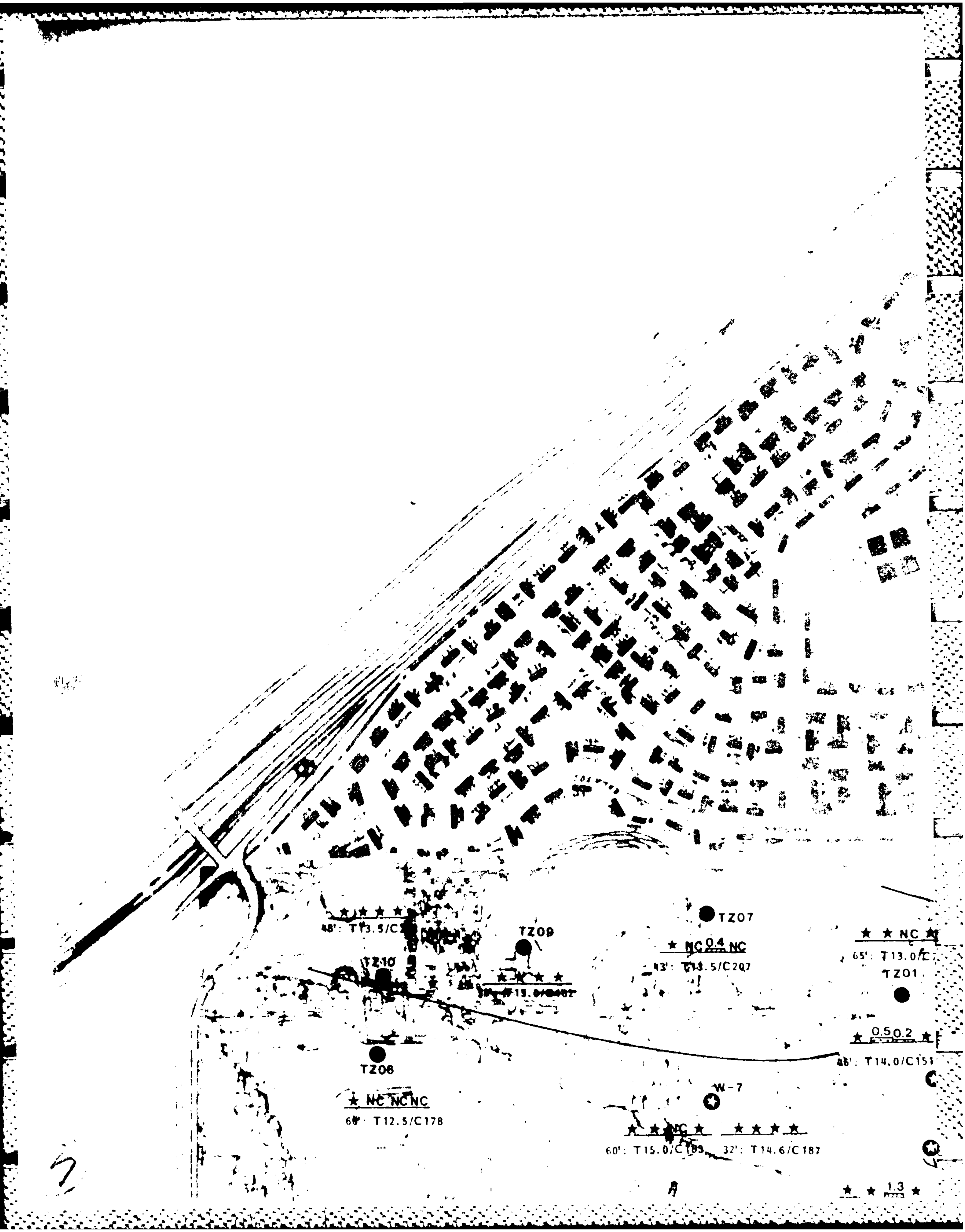
EPA12

AZ09

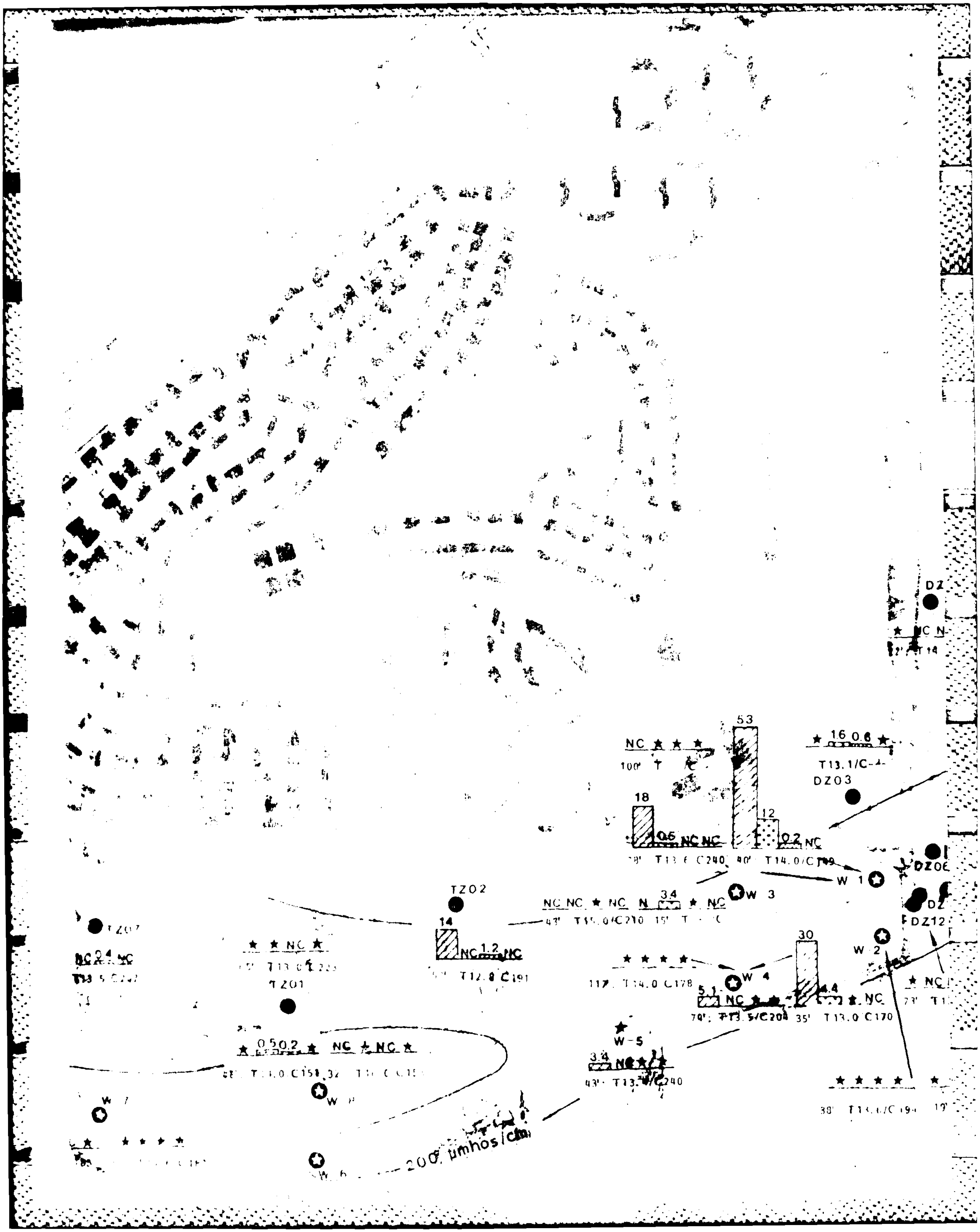
1.3 3.6


AZ06
EPA13
AZ04
AZ01
PA12
AZ08
NC 1.2 NCNC
AZ03
AZ09
1.3 3.6
NC 0.6 NC 1.2

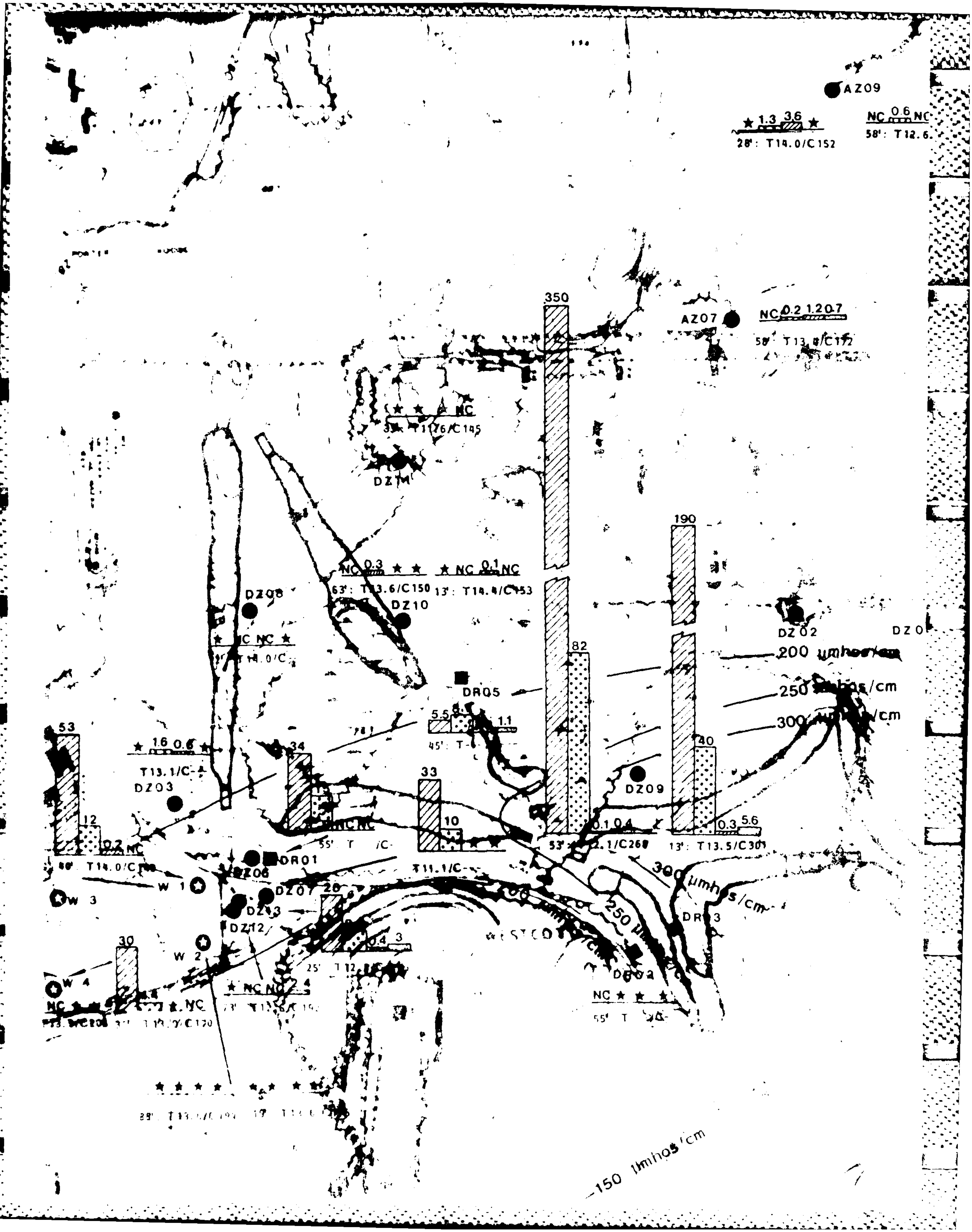
48'

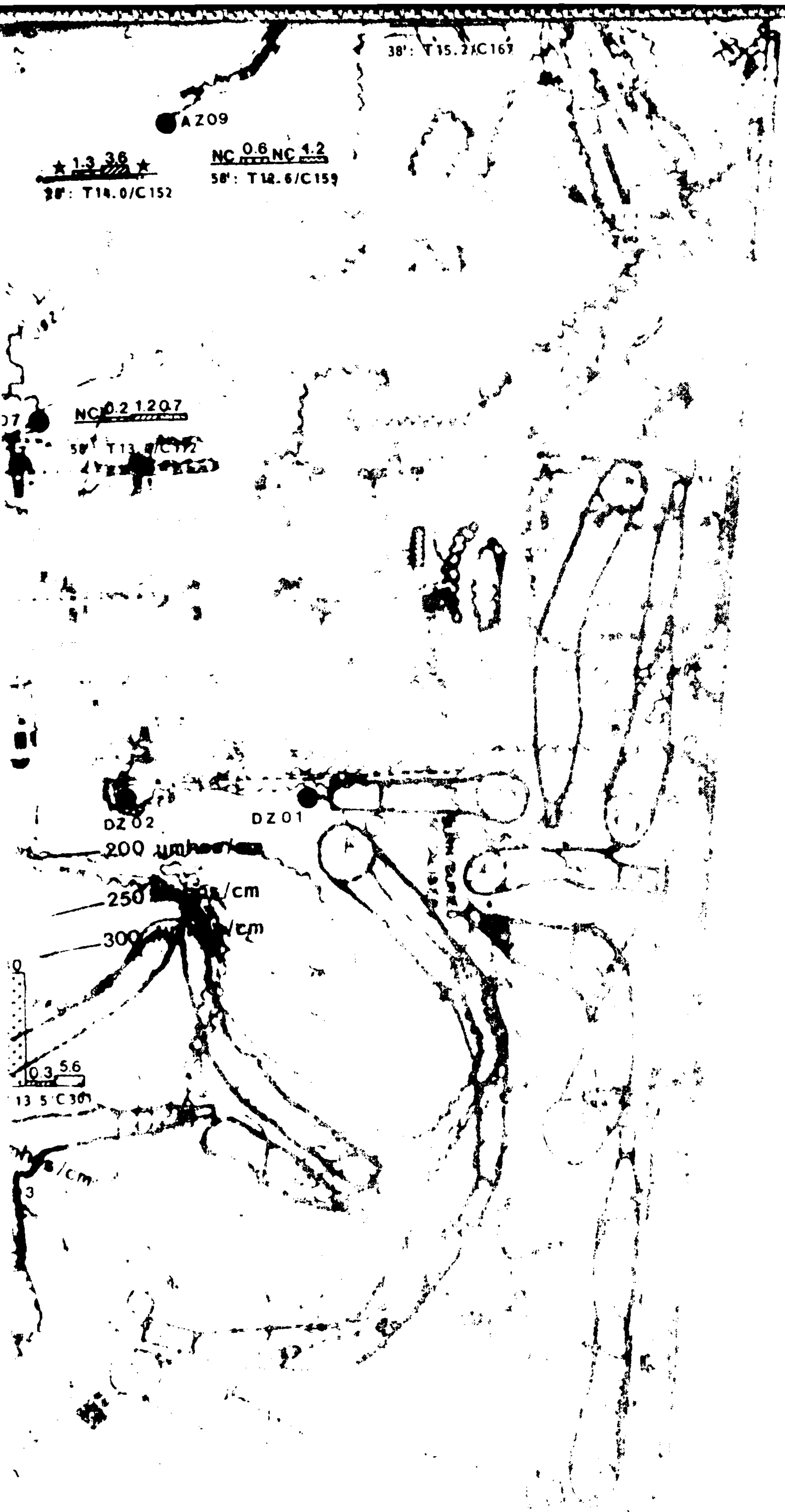


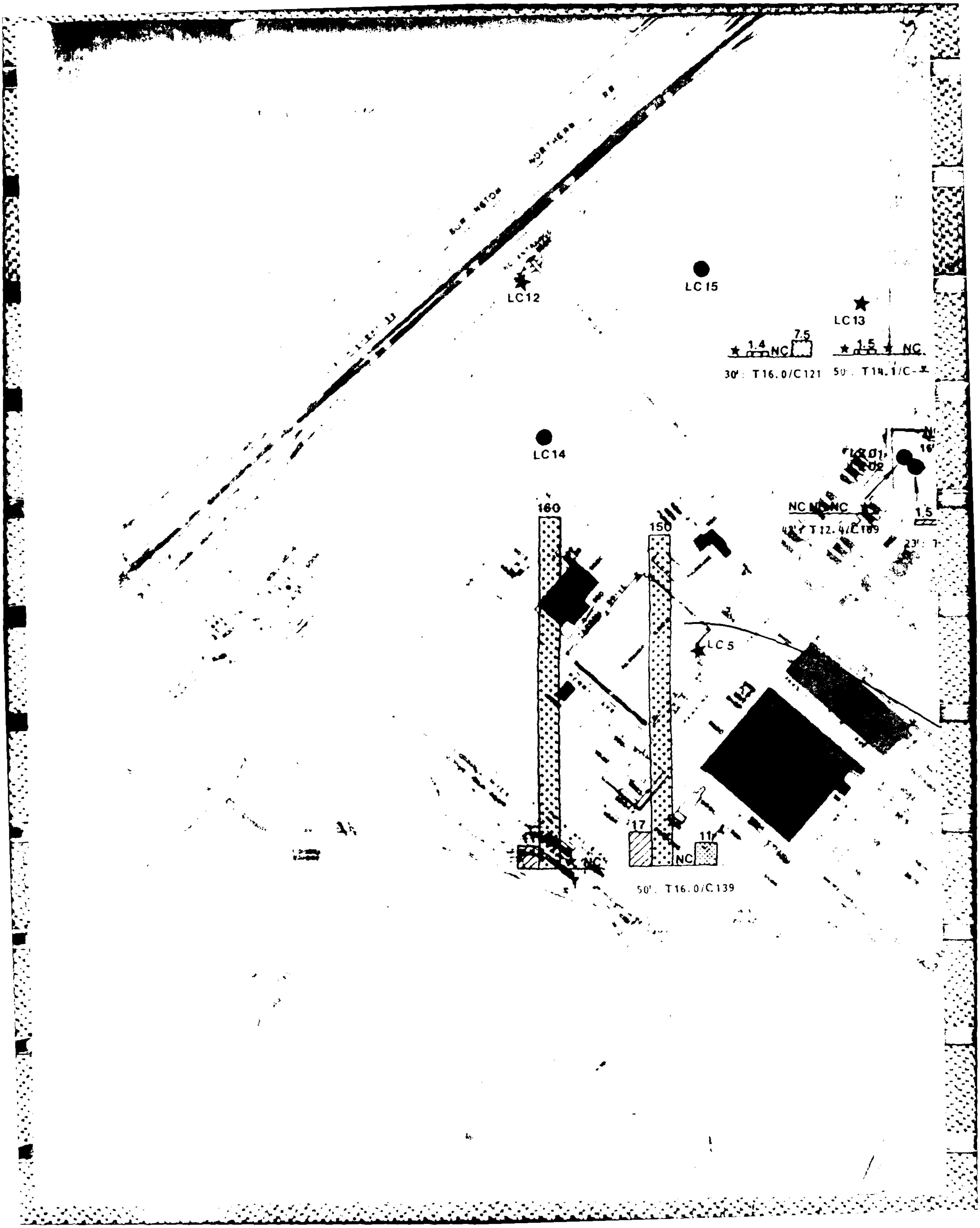
TZ07
NC 0.4 NC
TZ09
TZ10
65': T13.0/C
TZ01
0.5 0.2
TZ06
NC NC NC
60': T12.5/C178
W-7
32': T14.6/C187
1.3



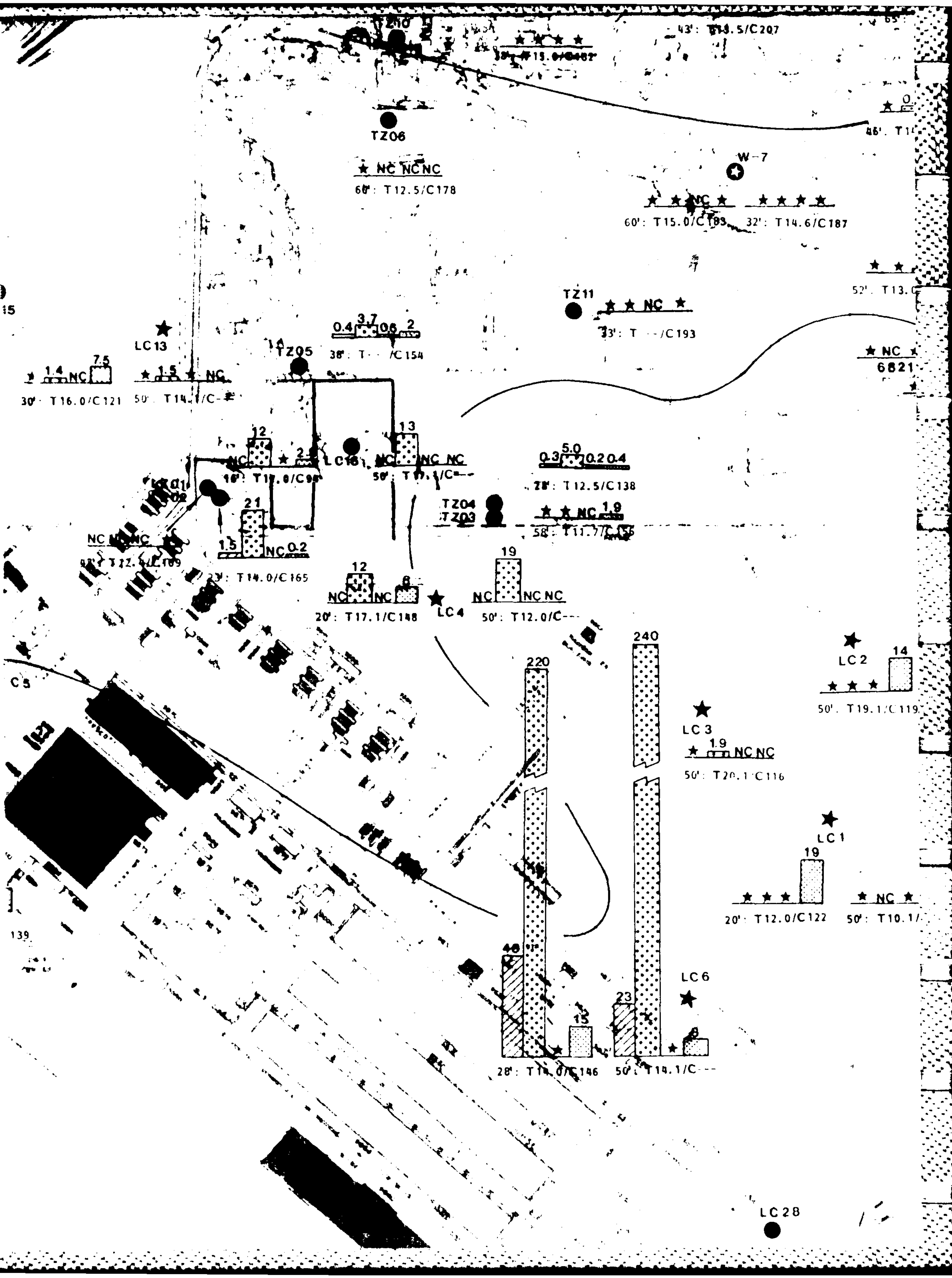
53
18
12
30
14
NC
DZ03
TZ02
TZ01
W 1
W 2
W 3
W 4
W-5
200 µmhos/cm
T13.1/C
T14.0 C178
T13.0 C170
T12.8 C191


AZ09
28': T14.0/C152
AZ07
58': T13.4/C172
350
190
DZ08
DZ10
63': T13.6/C150
13': T14.4/C153
DZ02
200 µmhos/cm
250
300
DR05
82
40
53
34
33
10
12
DZ03
DZ09
T13.1/C-
80': T14.0/C170
13': T13.5/C301
DR01
DZ06
DZ07
DZ13
DZ12
W 1
W 2
W 3
W 4
30
28
DR03
DR02
300 µmhos/cm
250
150 µmhos/cm

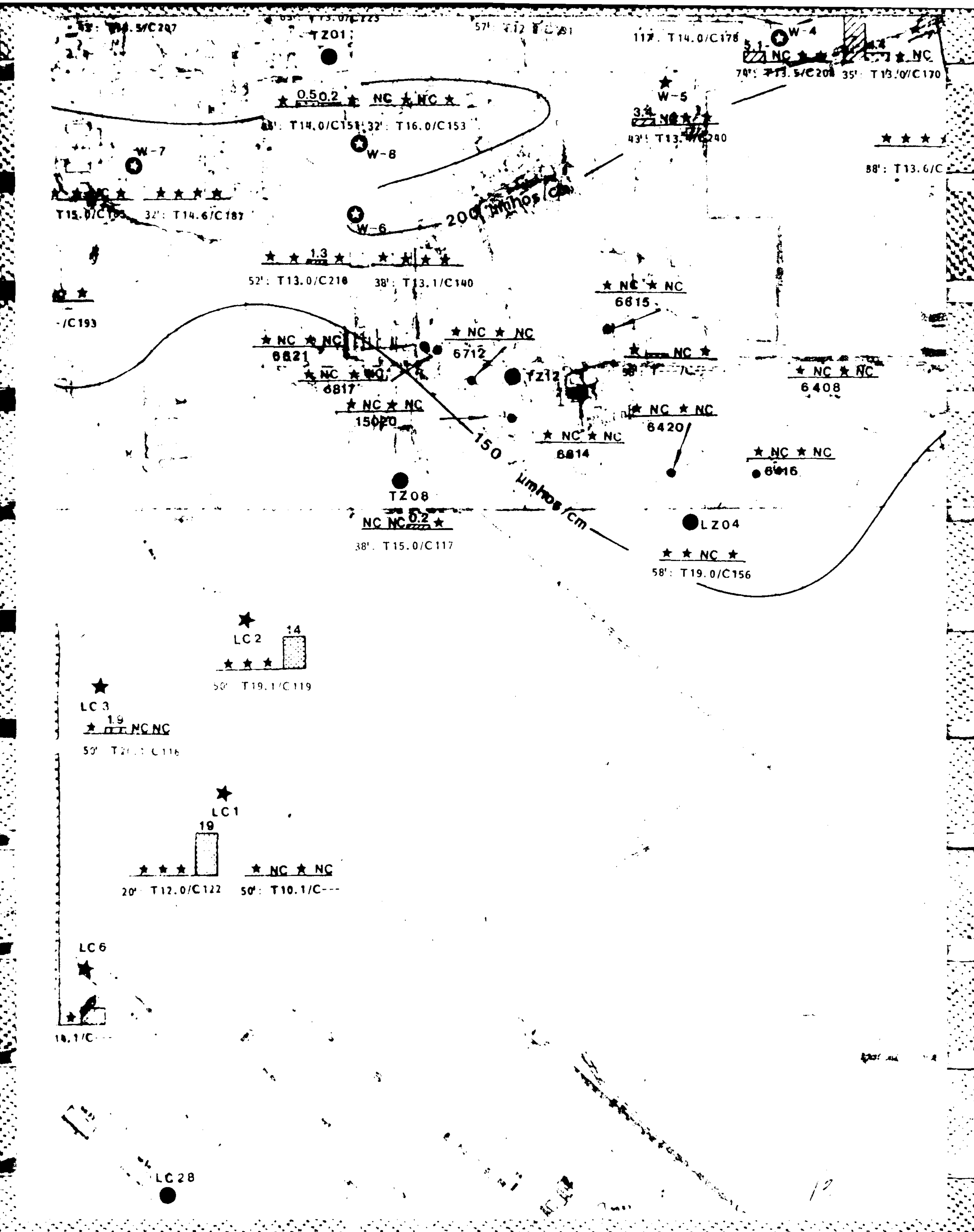

38': T15.2/C167
AZ09
1.3 3.6
38': T14.0/C152
NC 0.6 NC 4.2
58': T12.6/C159
NC 0.2 1.2 0.7
DZ02
DZ01
200
250
300
0.3 5.6
13.5 C30

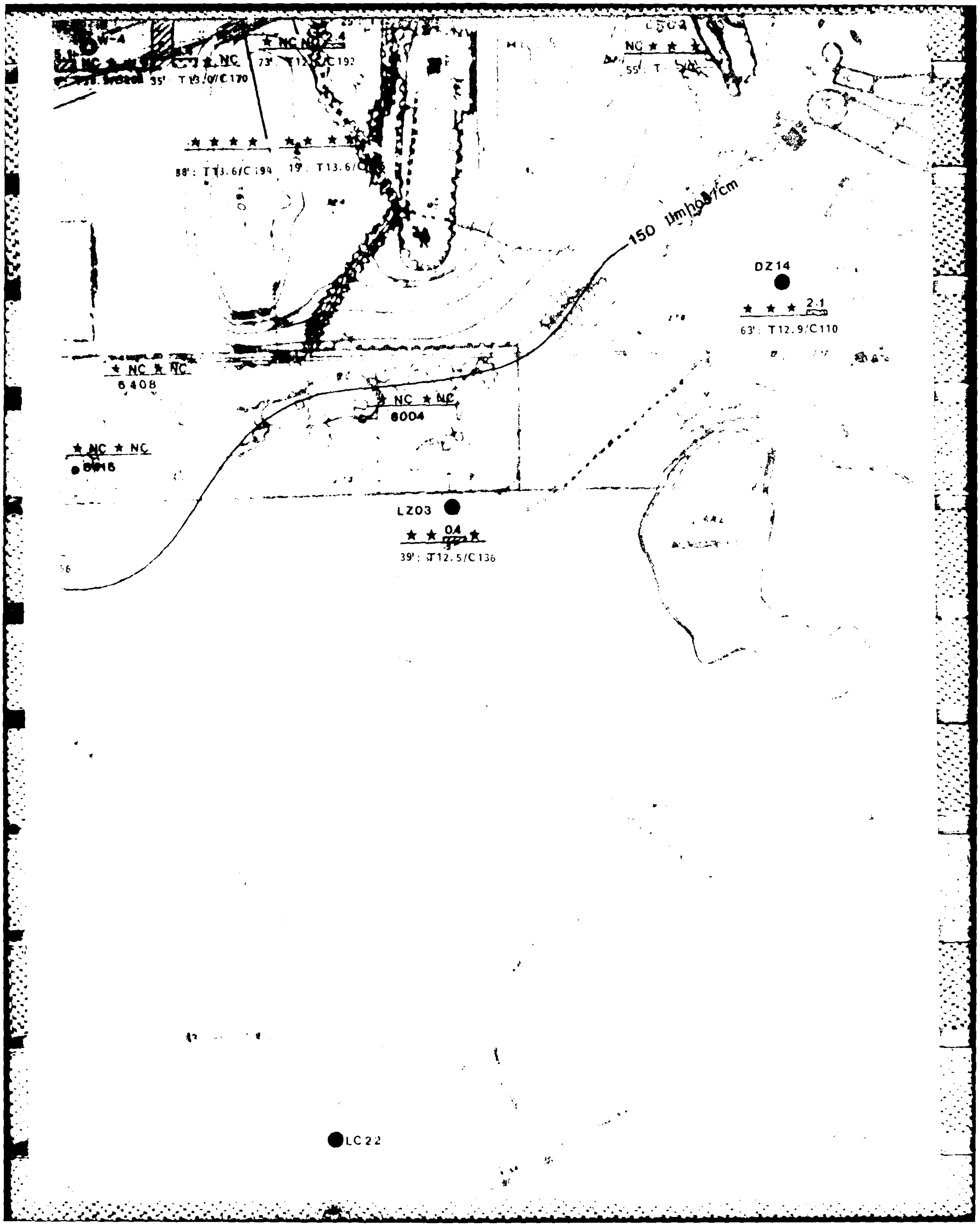


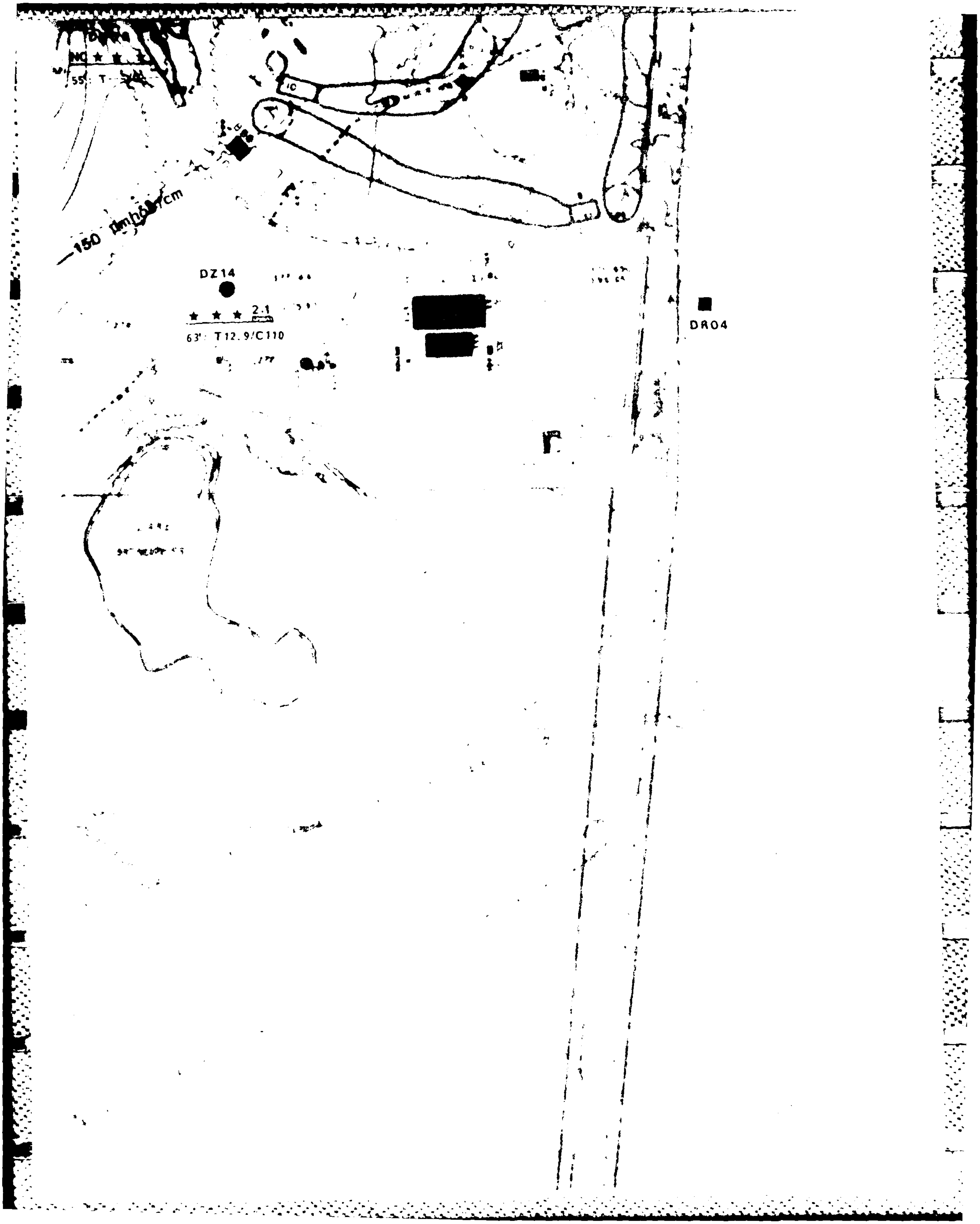
LC12
LC15
LC13
1.4
NC
7.5
30'. T16.0/C121
1.5
NC
LC14
160
150
NC
1.5
LC5
17
11
NC
50'. T16.0/C139

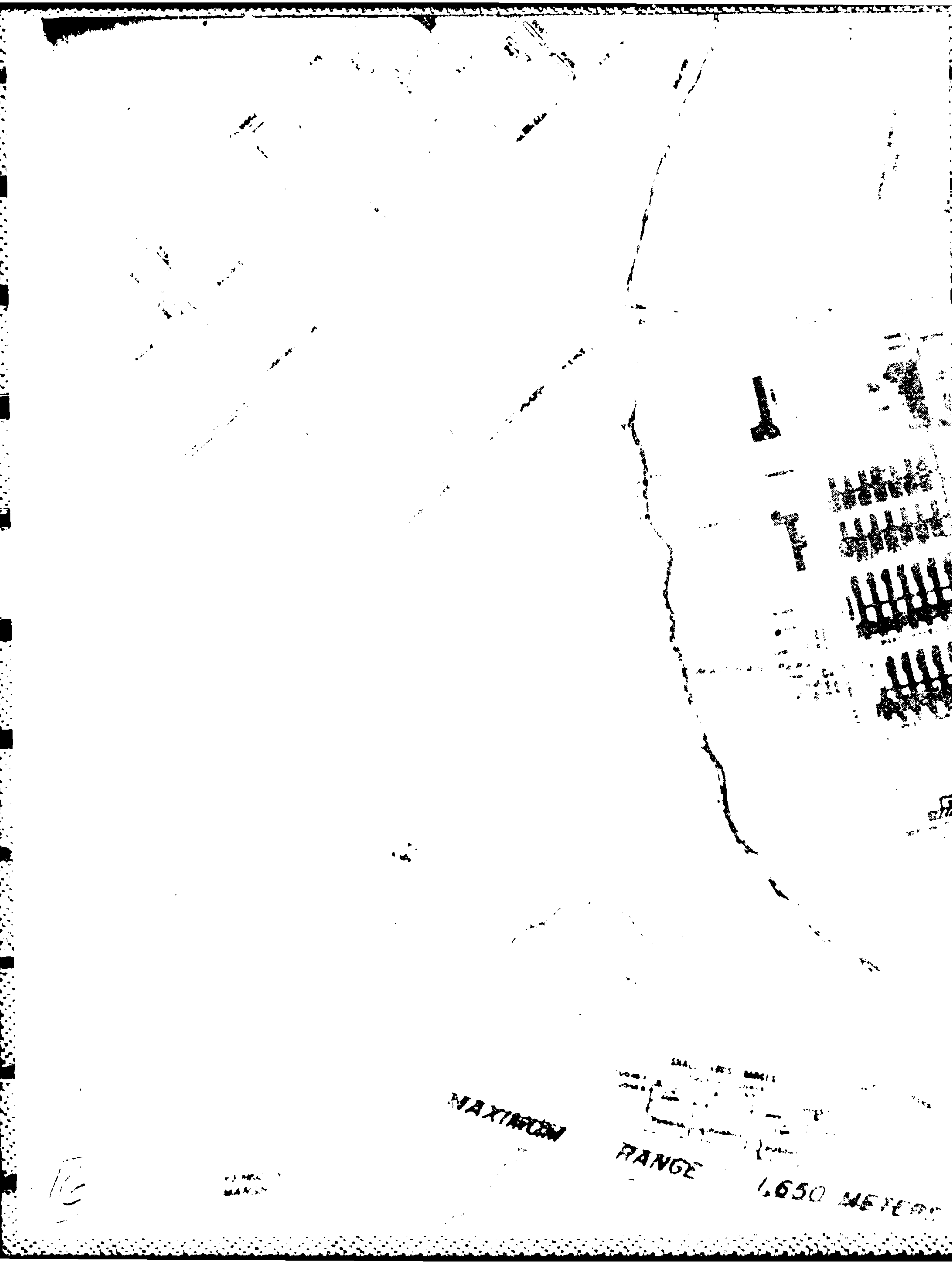


TZ06
W-7
★ NC NC NC
60': T12.5/C178
32': T14.6/C187
TZ11
★ ★ NC ★
LC13
TZ05
30': T16.0/C121
0.4 3.7 0.6 2
12
13
LC10
NC NC
0.3 5.0 0.2 0.4
28': T12.5/C138
TZ04
TZ03
21
1.5 NC 0.2
23': T14.0/C165
19
12
NC NC
20': T17.1/C148
LC4
NC NC NC
50': T12.0/C---
240
220
LC2
14
50': T19.1/C119
C5
LC3
★ 1.9 NC NC
50': T20.1/C116
LC1
19
20': T12.0/C122
★ NC ★
139
LC6
23
15
8
50': T14.1/C---
LC28

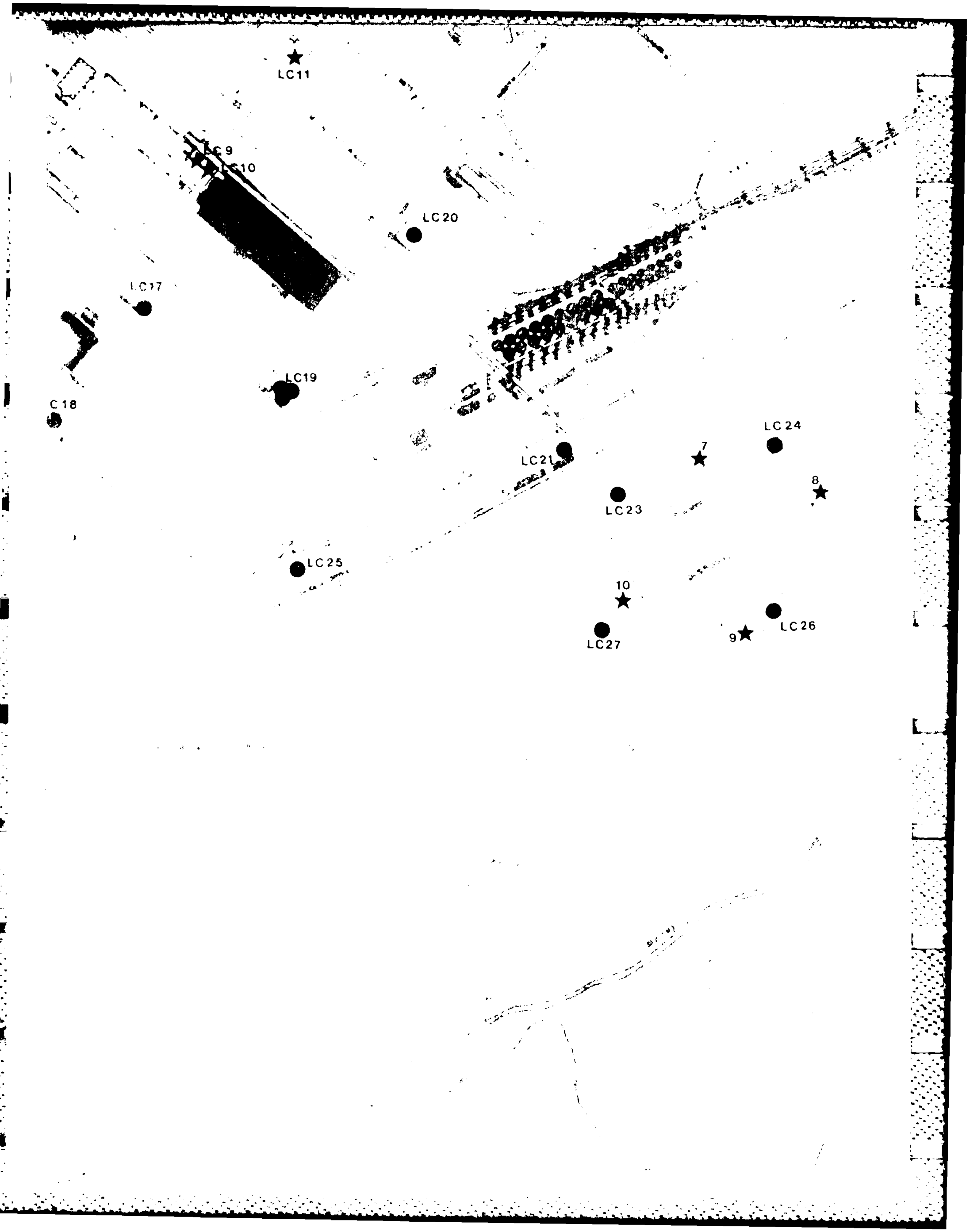

TZ01
W-4
117: T14.0/C178
NC
35': T13.0/C170
W-5
3.4
0.5 0.2 NC NC
32': T16.0/C153
43': T13.
W-8
W-7
88': T13.6/C
32': T14.6/C187
W-6
200 µmhos/cm
1.3
52': T13.0/C218
38': T13.1/C140
NC NC
6615
-/C193
NC NC
6821
NC NC
6712
NC
6817
TZ12
NC NC
6408
NC NC
15020
NC NC
6420
NC NC
6814
150 µmhos/cm
NC NC
6416
TZ08
NC NC 0.2
38': T15.0/C117
LZ04
NC
58': T19.0/C156
LC2
14
T19.1/C119
LC3
1.9
NC NC
LC1
19
20': T12.0/C122
NC NC
50': T10.1/C---
LC6
LC28


150 umhos/cm
DZ14
2.1
63': T12.9/C110
LZ03
0.4
39': T12.5/C136
NC ★ NC
6408
NC ★ NC
6004
★ NC ★ NC
88': T13.6/C194
35' T13.0/C170
LC22

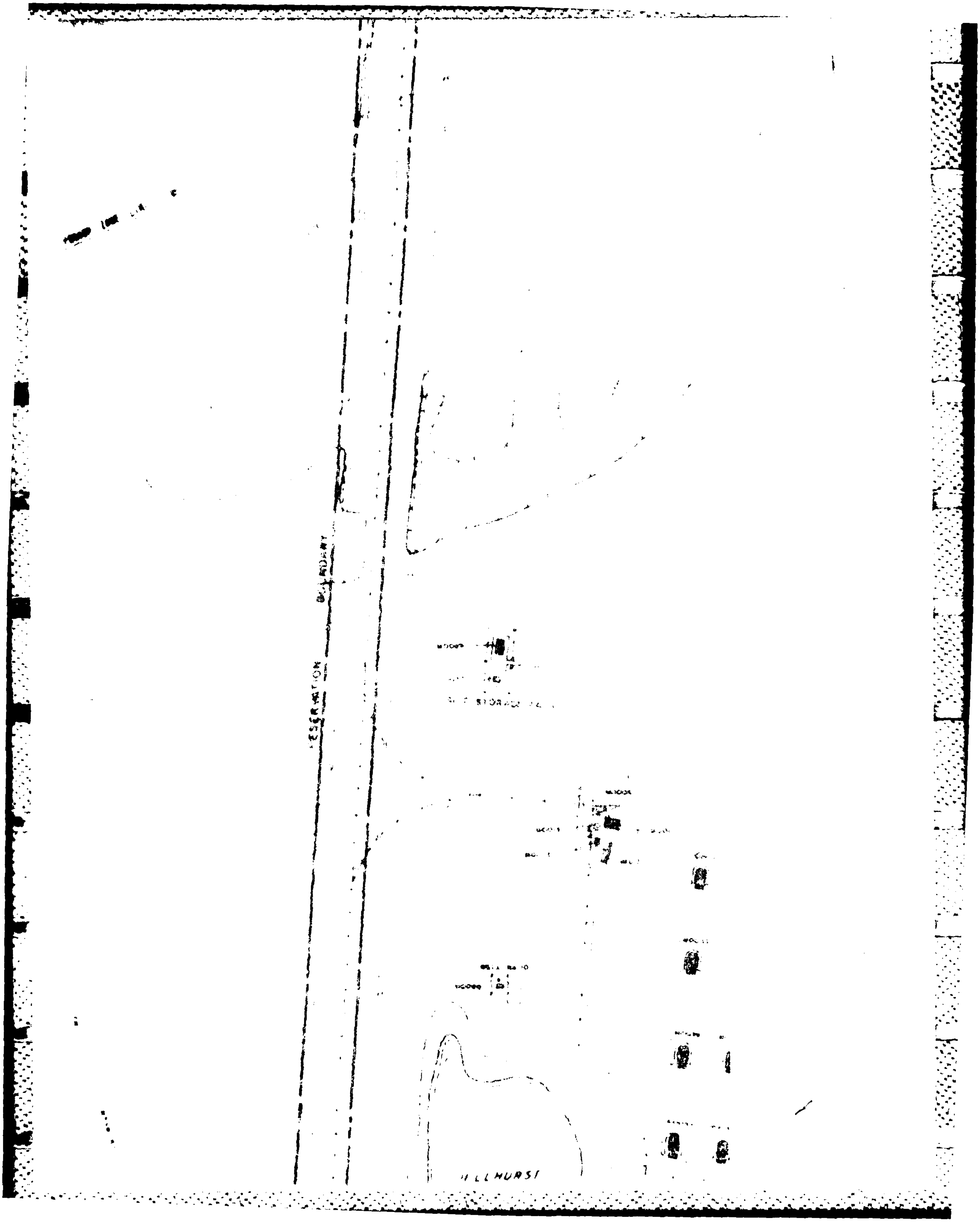

150 mhos/cm
DZ14
2.1
63'; T12.9/C110
DR04

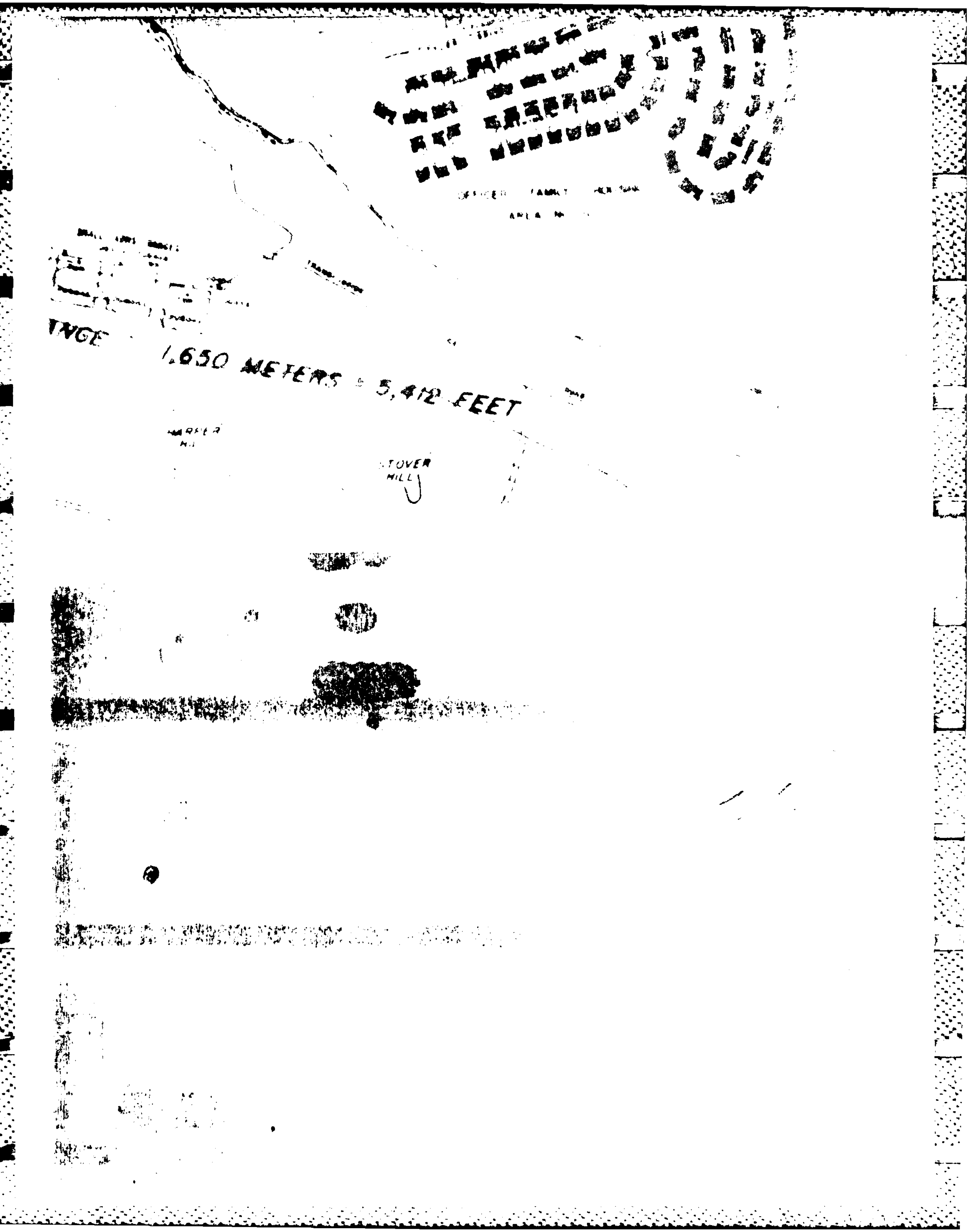

MAXIMUM
RANGE
1,650

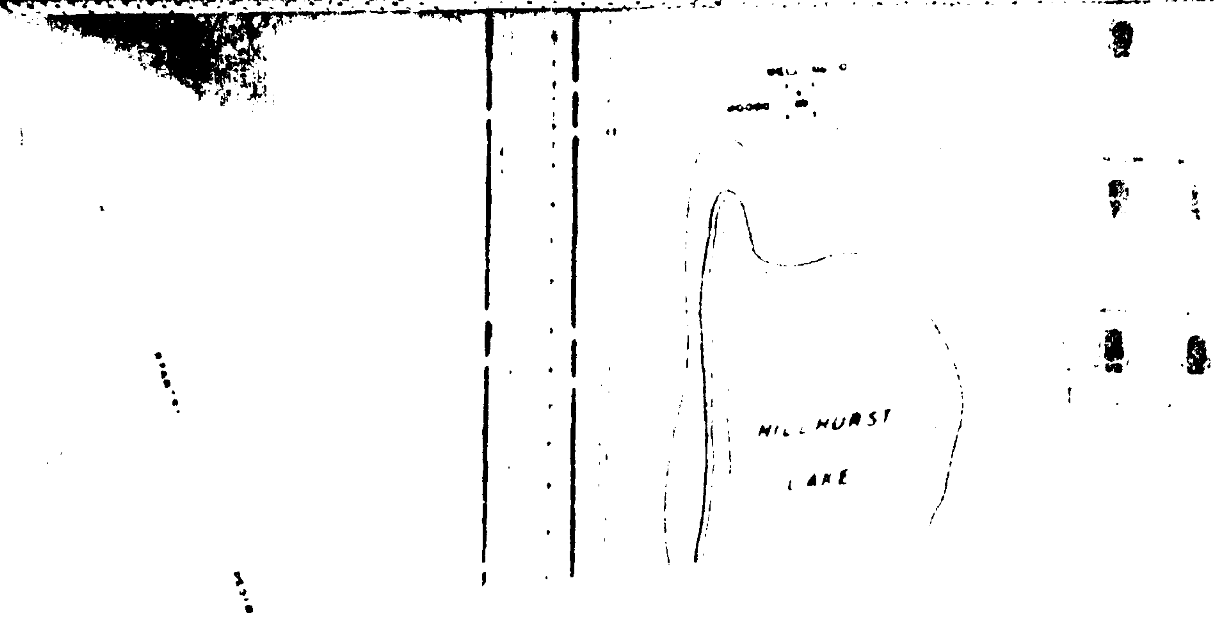

LC7
LC8
LC17
LC18
650 METERS


LC11
LC9
LC10
LC20
LC17
LC19
C18
LC24
7
LC21
8
LC23
LC25
10
LC26
9
LC27


LC24
7
8
LC26
9




1,650 METERS = 5,412 FEET



25

END
FILMED
4-86
DTIC